UNIVERSITY OF SOUTHAMPTON

Faculty of Social and Human Sciences

School of Psychology

THE DEVELOPMENT OF PLAY AND SOCIAL COMMUNICATION SKILLS IN PRESCHOOL CHILDREN WITH AUTISM SPECTRUM CONDITIONS

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Thesis for the degree of Doctorate in Educational Psychology

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ABSTRACT

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By Chloe Allen

Children with autism spectrum conditions (ASCs) show symptoms related to deficits in imagination, social interaction and communication. These differences have an impact on the development of their play skills. Compared to typically developing children, children with ASCs show repetitive and largely sensorimotor play; more developmentally complex forms of play are less apparent. Furthermore, research has demonstrated that play skills are associated with a wide range of other developmental areas, including social cognitive skills. Consequently play is recognised as both a subject of, and platform for, intervention. The literature review explored a variety of interventions aiming to enhance play skills and identified a need for future research to utilise more rigorous methodologies and explore a broader range of outcomes.

The empirical paper aimed to build on previous research by using a randomised controlled trial methodology, to explore the effects of the Identiplay intervention for 14 young children with ASCs. Outcome measures included children's developmental level of play, social level of play and frequency of communication behaviours pre and post intervention and at follow up. Teachers were also asked to rate children's prosocial behaviour and peer problems. The results showed children in the intervention group made significant gains in the developmental level of play over time. Children in the comparison group demonstrated significant improvements in the frequency of their social communication behaviours over time. There was no significant change in levels of social play, prosocial behaviour or peer problems in either group over time. The results were broadly consistent with previous research demonstrating that interventions can enhance the developmental level of children's play. The lack of significant change within the intervention group for social play and social communication behaviours is in contrast to previous research. Implications and directions for future research are discussed.

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Declaration of Authorship

I, Chloe Allen, declare that the thesis entitled 'The development of play and social communication skills in preschool children with autism spectrum conditions' and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission

Signed: ...

Date: 26th October 2012

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List of abbreviations

χ^2 = test statistic for Friedman's ANOVA

ASCs = Autism Spectrum Conditions

BAS II = British Ability Scales II

CARS2 = Children's Autism Rating Scales Second Edition Standard Version

ES = effect size

IQ = intelligence quotient

M = mean

M-COSMIC = Modified Children's Observation Schedule to Measure Intentional Communication

N = sample size

p = probability, significance of a test statistic

r = Pearson's product moment correlation coefficient

RCI = Reliable Change Index

RCT = randomised controlled trial

SCQ = Social Communication Questionnaire

SD = Standard deviation

SDQ = Strengths and Difficulties Questionnaire

T = Test statistic for Wilcoxon Signed Ranks Test

T1 = Time One, baseline

T2 = Time Two, post intervention

T3 = Time Three, follow up

ToM = Theory of mind

U = Test statistic for Mann Whitney U

Chapter 1: Literature Review

Understanding the significance of play in development: An exploration of its role in the development of children with autism spectrum conditions

1.1 Introduction

Play has been described as the primary activity of typically developing preschool children (Smith & Gosso, 2010). It is defined as a pleasurable activity, without an externally imposed goal that consists of spontaneous, voluntary and flexible behaviours that involve active participation from the player (Jordan, 2003; Mastrangelo, 2009). Research has found that the development of play skills in typically developing children is positively associated with a range of other skills, such as language, joint attention and social competence (Power, 2000; Williams, 2003), suggesting that it is an important marker of wider development.

Research exploring the content of play within groups who show atypical trajectories in the development of play skills is lacking (Williams, 2003). One group of young children who show developmental differences and delay in their early play skills (compared to typically developing children), are those with Autism Spectrum Conditions (ASCs)[1]. The diagnosis of children with ASCs includes symptoms related to deficits in social interaction, communication and imagination (American Psychiatric Association, 2000). In support, research has found that the play behaviour of this group of children is often described as repetitive and ritualistic (Paterson & Arco, 2007).

Because of its link to development more broadly, the value of enhancing early play skills in young children with ASCs is widely recognised (Christensen et al., 2010). For example, some research suggests that play interventions can lead to gains in social competence and joint attention in this group of children (Kasari, Freeman, & Paparella, 2006; Kasari, Paparella, Freeman, & Jahromi, 2008; Manning & Wainwright, 2010). In support, recent research indicates that the play skills of young children with ASCs are significantly associated with their concurrent social competence (Manning & Wainwright, 2010).

[1] The term ASCs in this review will include children diagnosed with autism, Asperger Syndrome, and pervasive developmental disorder. ASCs are characterised by deficits in social interaction, communication, and imagination (American Psychiatric Association, 2000). A diagnosis of Autistic disorder is based upon disturbances in all three areas (social interaction, communication and imagination) being present before the child is 3 years old (American Psychiatric Association, 2000). Individuals who have some of these difficulties but do not meet full criteria for Autistic disorder are diagnosed with pervasive developmental disorder not otherwise specified. Asperger's disorder is diagnosed in individuals with no history of language delay and an IQ within the average to above-average range.

The aim of this review is to explore the role of play in development. Its objective is to evaluate the positive effect of play interventions on play behaviours and social functioning more broadly in children with ASCs. In accordance with a developmental psychopathology approach it will review theory and research related to the development of play and associated skills in typically developing children and use this literature as a basis to consider play skills in children with ASCs. Theoretical accounts of the differences observed in the play skills of children with ASCs and the interventions that have aimed to enhance their play skills are considered. Following this, there is a general critique of the play intervention literature in order to avoid repetition of common limitations in the field. In addition, suggestions for future research evaluating the impact of play interventions for young children with ASCs are outlined.

1.2 The significance of play in development

Constructivist theorists (e.g. Piaget, 1962; Vygotsky, 1978) acknowledged the significance of play for wider development. Piaget considered that in play children assimilate new experiences with existing schema, and therefore consolidate existing knowledge (Piaget, 1962). Vygotsky (1978) emphasised the social nature of play, suggesting that meaning is constructed through social interaction. He considered that symbolic play liberates children from the constraints of reality, promoting the development of imagination and ideas. Therefore, play was construed as a primary source of development within the early years:

> In play a child always behaves beyond his average age, above his daily behaviour; in play it is as though he were a head taller than himself. As in the focus of a magnifying glass, play contains all developmental tendencies in a condensed form and is itself a major form of development. (p.108)

Play provides a safe environment for children to learn, practice skills and experiment, and researchers have proposed that it represents an effective vehicle for learning (Arthur, Bochner, & Butterfield, 1999; Jordan, 2003). Similarly, other researchers have suggested that play is integral to other aspects of early development, such as social, cognitive, representational and linguistic skills (Casby, 2003). Across the last four decades of research in play, there has been a shift from seeing play as the topic of interest, to understanding its broader role in the development of related social and cognitive skills including language, joint attention, and social cognition (Power, 2000; Williams, 2003).

1.2.1 Cognitive development and play. A large body of research has focussed on the development of play in young children (Casby, 2003). Early researchers (e.g. Piaget, 1962), made distinctions between different cognitive levels of play, referring to practice play and symbolic play. More recently, researchers have preferred to identify more precise stages of play (e.g. Williams, Reddy, & Costall, 2001) and modern taxonomies of play often propose that the ability to use conventional objects in a functional way is a cognitive stage distinct from either sensorimotor or symbolic play. Therefore, three cognitive stages of early childhood play are frequently referred to in the literature: sensorimotor play (exploring toys in a sensory way), functional play (using toys according to their physical properties and for their intended uses) and symbolic play (where the child attributes imaginary properties to a toy (Jordan, 2003).

Children have been found to progress through the cognitive stages of play in a linear way, with different forms of play beginning early in life and emerging at different stages (Williams, 2003). Play has been described as an observable reflection of a child's cognitive development that is reflected in the move through sensory exploration of objects towards purposeful problem solving and recognising the function of objects. At its pinnacle, play can become divorced from the physical props and become symbolic in nature (Jordan, 2003). Symbolic play is suggested to signify children's growing ability to use symbols in thought (Piaget, 1962). Furthermore, it is recognised that each new stage adds to the previous one, rather than replacing it, so that a child may continue to play at a basic level some of the time even when they have acquired more advanced skills (Jordan, 2003).

Although it is difficult to ascertain when children first begin to play (Wolfberg, 1999), Smith and Gosso (2010) describe how babies are born with reflex behaviours, such as sucking and grabbing. These behaviours are used initially for feeding, but can also be used for manipulating objects and they become a core feature of sensorimotor play in infancy. Infants also show signs of playful orientation through smiling and cooing when interacting with people and objects that provide contingent responses, such as mobiles that activate when the child displays a certain action (Arthur, et al., 1999). Sensorimotor play usually emerges at around three months of age (Sheridan, 2005) and provides an important opportunity for children to begin exploring the environment and the properties of objects (Williams, 2003). Initially the same action patterns (e.g. banging, mouthing and sucking) are used indiscriminately, but as the child grows older these vary as a specific function of the object (Williams, 2003). For example, young children may suck on a rattle initially but will later prefer to shake it.

Functional play has been found to emerge between 12 and 18 months of age and is defined as the "appropriate use of an object or the conventional association of two or more objects, such as a spoon to feed a doll or placing a teacup on a saucer" (Sigman & Ungerer, 1981). This can include, for example, children imitating and performing activities they have observed, such as putting a pan on the cooker, drinking from a cup or bringing a comb to their hair (Sheridan, 2005; Williams, 2003). Initially these actions are very brief, but they rapidly develop into complex sequences of actions, involving more play objects (Smith & Gosso, 2010). These sequences, or play scripts, can extend to dolls and other people (e.g. holding a cup to the doll's mouth). While some researchers have included functional play within their definition of symbolic play, Leslie (1987) suggests that in functional play, we cannot be sure that a child is pretending. For example, if an infant is observed putting a pan on a toy cooker, the infant may be demonstrating knowledge of the conventional uses of small, yet real, objects (Williams, 2003).

Symbolic play is characterised by one of three types of actions: substitution (the use of one object as another), imaginary play (the attribution of false properties to an object or the imagined presence of an absent object), and agent play (in which a doll or similar object becomes the agent of an action) (Leslie, 1987). Children typically begin to demonstrate symbolic play between 2 and 3 years of age (Lam & Yeung, 2012). As children grow older, they start to display the capacity to transform available objects into more relevant props for their play (Wolfberg, 1999). In addition, children have been shown to transform themselves into different roles by animating toys or dramatizing characters at this age. Wolfberg (1999) noted that children across development will start to integrate several play scripts to create elaborate dramas with diverse and evolving episodes.

1.2.2 Social development and play. Throughout early childhood, the social components of play also show stage-like development (Jordan, 2003). Jordan (2003) noted that the separation of play into two cognitive and social strands is an abstraction for academic purposes, as in reality the two aspects are intertwined. Early researchers (e.g. Parten, 1932) used observations of play and peer interaction to develop several categories of social play. Young children progress from solitary play through a period of increasing socialisation (Jordan, 2003). At about 1 year of age, the social exchanges between children become longer and shared activity becomes more evident (Arthur, et al., 1999). This change in behaviour marks the emergence of parallel play, which

involves playing in closer proximity to others with similar materials and observing or copying others in their play (Smith & Gosso, 2010). Parallel play is argued to help children understand the social rules that lead play and to stimulate modelling and imitation (Wolfberg, 1999). Over the following 2 years, children have been found to gradually reduce their dependence on object-centred shared play in favour of an increasing focus on peer social interaction. As children engage in cooperative play they start to negotiate roles in joint play experiences that require reciprocal exchanges increasing in frequency, length and complexity (Wolfberg, 1999). Children typically begin sharing play scripts between the ages of 2 years and 2 years 6 months. This progresses to assigning social roles to each other during play (Arthur, et al., 1999).

At this stage children are also developing their social competence more broadly, for example, adding new skills such as sharing and turn taking, to their existing repertoire (Jordan, 2003). Children are described as moving backwards and forwards along a continuum that reflects increasing complexity and cohesiveness in social play (Mastrangelo, 2009). Although with age, children usually prefer the company of peers, on occasion they choose to engage in solitary play. In this context, solitary play can provide an opportunity for children to practise newly emerging skills (Jordan, 2003).

1.2.3 Play and language development. Play provides many opportunities for developing social skills through its increasing reliance upon social interactions (Lewis, 2003). It has been suggested that play and language are related due to their use of symbolic representation and organisational complexity (Lewis, 2003). For example, in language development, children produce single words when they start to play with single objects. As they begin to produce increasingly longer utterances, children begin to incorporate several objects into their play. Consistent with this view, play behaviour has been shown to correlate with receptive and expressive language development in typical children aged between 3 and 6 years (Sigman & Ungerer, 1984). Functional play has been shown to be associated with expressive language skills in typically developing children aged between 1 and 6 years (Lewis, Boucher, Lupton, & Watson, 2000). In addition, Lewis et al., (2000) found that symbolic play was significantly correlated with receptive and expressive language skills. Similarly, Charman et al. (2000) reported a significant positive relationship between functional and symbolic play and expressive (but not receptive) language in 1-2 year-old typically developing children.

Longitudinal studies have further demonstrated that play skills at around one year were associated with concurrent language skills and also predicted language skills around 10 months later (Ungerer & Sigman, 1984). Conversely, this study did not find

that language skills at 1 year predicted later play skills, suggesting that play skills may facilitate language development (Lewis, 2003). Further research has found that greater complexity of toy-play skills at age 3 had a positive influence on peer competence mediated by higher language ability (both expressive and receptive) and greater ability to maintain focussed attention on a task at 8 years of age (Hebert-Myers, Guttentag, Swank, Smith, & Landry, 2006).

1.2.4 Play, joint attention and social competence. Joint attention is characterised by shared attention between social partners in relation to objects or events (Toth, Munson, Meltzoff, & Dawson, 2006). These episodes typically first occur between 6 and 12 months of age, and mark an infant's awareness that their experience with objects can be shared with others. At around 1 year of age, infants start to take an active role in coordinating their attention to objects that interest them and their partner through their use of declarative communicative gestures, such as showing, giving and pointing (Bigelow, MacLean, & Proctor, 2004). Through this use of gesture, infants demonstrate their awareness of others as beings whose intentions can be influenced. At approximately the same time, functional play starts to emerge. By 12 months of age, most children are able to both initiate and respond to joint attention episodes. These episodes have been referred to as "hotspots for learning" because it is through joint attention interactions that infants begin to link objects and events with words (Tomasello, 1988; Toth, et al., 2006), and joint attention skills have been found to predict later language outcomes (Toth, et al., 2006; White et al., 2011).

Within a play context, some researchers suggest that joint attention provides the optimal conditions for young children to learn from more experienced play partners such that they become aware of their play partner's actions on the objects of interest (Bigelow, et al., 2004). Indeed Bigelow et al. (2004) found that when the play of 1 year old children included episodes of joint attention with their mother it was more advanced (i.e. contained more functional play) than play without joint attention episodes. Further, the infants' advanced play during joint attention episodes with their mother also transferred to their solitary play (Bigelow, et al., 2004).

Play has also been linked to the development of social competence. For example, research has found that in typically developing children aged between 3 and 5 years, the amount and complexity of their symbolic play predicted teacher ratings of peer social skills, popularity, and positive social activity, independent of IQ, age and gender (Connolly & Doyle, 1984). Further, social symbolic play was the strongest predictor of

social skills in peer interactions (Connolly & Doyle, 1984). In typically developing preschool children, Gagnon and Nagle (2004) also found that both parent and teacher ratings of children's play with their peers were significantly positively associated with their corresponding observations of children's social-emotional development, as indexed by the child's social interactions, ability to make and maintain friends and their ability to understand emotional expression. In addition, social play in 3- and 4-year-old preschool children was found to significantly correlate with parent rated social competence (reflecting social cooperation, social interaction, and social independence in their children).

Consistent with the notion of play reflecting development more broadly, atypical elevated levels of solitary play have been found to significantly positively correlate with problem behaviours (i.e. internalising and externalising behaviours) and significantly negatively correlate with social competence (i.e. social cooperation, social interaction, social independence, friendliness and peer acceptance) (Dodge, Laird, Lochman, & Zelli, 2002; Nelson, Hart, & Evans, 2008; Newton & Jenvey, 2011).

1.3 Play and children with Autism Spectrum Conditions

Theory and research have demonstrated that play skills develop rapidly during early childhood and are associated with or predictive of the development of language, social competence and joint attention skills (e.g. Charman, et al., 2000; Lewis, et al., 2000; Toth, et al., 2006; White, et al., 2011). Understanding the development of play and associated skills in typically developing children provides a good basis for exploring groups of children who show delayed or deviant play skills.

The play activities of young children with ASCs are described as delayed and qualitatively different to those of typically developing children (Rutherford, Young, Hepburn, & Rogers, 2007). Children with ASCs have been found to engage more frequently in repetitive, ritualistic play using a limited range of toys compared with typically developing children (Paterson & Arco, 2007). For example, Libby, Powell and Jordan (1998) compared the spontaneous play behaviours of children with ASCs (M = 10 years 3 months), to that of children with Down syndrome (M = 4 years 4 months) and typically developing children (M = 2 years 1 month). The children were matched for language expression and comprehension abilities. Video recordings of the children's play were coded for instances of sensorimotor, functional, and symbolic play. The children with ASCs were found to produce significantly more sensorimotor play than the other groups. Both the group with Down syndrome and the group with ASCs produced less functional play than the typically developing children. Further, the group

with ASCs performed significantly less symbolic play than either of the comparison groups.

The age difference between groups in this study raises questions about the validity of the matching; children with ASCs were likely to have been exposed to significantly more play opportunities and years of education than the other children. Further research exploring the functional play of children with ASCs found that 18 month old siblings of children with ASCs, who were later diagnosed with ASCs themselves, showed fewer functional play acts, and more non-functional repetitive behaviours during free play than typically developing comparison children (Christensen, et al., 2010).

Some researchers have explored the ability of children with ASCs to engage in different developmental levels of play (Jarrold, Boucher, & Smith, 1996; Williams, et al., 2001). Williams et al. (2001) explored the functional play of children with ASCs aged between 11 months and 5 years 5 months, compared to children with Down syndrome and typically developing children who were matched on measures of cognitive and language ability. Play was assessed via 15 minute video recordings of the children engaging in free play at home with a standard set of toys. Children with ASCs demonstrated significantly fewer novel functional play acts, and significantly fewer elaborate functional play acts (play acts using dolls, or with several objects accompanied by gestures or vocalisations) compared with the other groups.

Deficits in symbolic play are also widely reported in children with ASCs and a failure to engage with toys symbolically is an item that is included on many autism diagnostic systems (Rutherford, et al., 2007). For example, Rutherford et al. (2007) compared the symbolic play of young children with ASCs (M = 4 years 9 months old) to children with developmental delays (M = 4 years 9 months) and typically developing children (M = 2 years 6 months), matched for mental age. The group of children with ASCs demonstrated significantly fewer examples of symbolic play compared to both other groups. Further studies indicate that the functional and symbolic play of young children with ASCs is reduced in frequency, novelty and complexity when compared to children with developmental delays or typically developing children (Christensen, et al., 2010; Rutherford, et al., 2007). In summary, the play behaviours of children with ASCs compared to typically developing children, and children with developmental delays demonstrate a greater reliance upon early forms of play, such as sensorimotor play, with comparatively less use of functional and symbolic play.

For many children with ASCs the different stages of play do not develop, or develop in a fragmented fashion (Mastrangelo, 2009). However, research has demonstrated that some children with ASCs do produce symbolic play acts (e.g. Libby, et al., 1998). Research suggests that the most common type of symbolic play act performed by children with ASCs is object substitution. This is the first form of symbolic play to emerge in typically developing children; providing some evidence that play skills in children with ASCs are delayed (Libby, et al., 1998). Further, research has demonstrated a strong association between joint attention and symbolic play in typically developing children, children with developmental delay, and children with ASCs (Rutherford, et al., 2007). This evidence has also been used to support the proposition that the developmental processes are the same across the different groups, but are delayed in children with ASCs.

While some researchers have proposed that play skills in children with ASCs are delayed, others have highlighted developmental deviance in this group. Differences in this group include a lack of fluency in play, the repetitive nature of play and the continuing use of sensorimotor play. Taken together, evidence suggests that children with ASCs demonstrate both deficits and delays in their play skills compared to typically developing children (Rogers, Cook, & Meryl, 2005).

1.4 Correlates of play skills in young children with ASCs

As in typically developing children, a range of skills correlate with play skills in young children with ASCs. For example, in a study exploring the social and cognitive correlates of language in 3 to 6 year old children with ASCs, receptive language ability was positively correlated with functional play, and both expressive and receptive language abilities were similarly correlated with symbolic play skills (Mundy, Sigman, Ungerer, & Sherman, 1987). Sigman and Ruskin (1999) conducted longitudinal research and found that both functional and symbolic play ability in 3 to 6 year old children with ASCs were correlated with early language ability. Furthermore, functional play at 3 to 6 years of age predicted expressive language ability 9 years later. Toth et al. (2006) reported that the functional and symbolic play of 3 to 4 year old children with ASCs was significantly correlated with concurrent expressive and receptive language ability. The frequency of symbolic and functional play acts in a structured play assessment was a significant predictor of the rate of communication development across the following 2 years (assessed using the Vineland Adaptive Behavior Scales) (Sparrow, Balla, Cicchetti, & Doll, 1984). Taken together these studies highlight the importance of play skills in language development of children with ASCs.

1.4.1 The relationship between play and social cognition in children with ASCs. The social cognitive skills and the development of social play of children with ASCs have been described as delayed and deviant, compared with typically developing children (Clifford, Hudry, Brown, Pasco, & Charman, 2010; Jordan, 2003). Research also indicates that the play of children with ASCs is less likely to engage the interest of peers than matched typically developing children and children with Down Syndrome (Williams, et al., 2001). Correlations have been found between play and indicators of social cognitive ability (i.e., joint attention skills) in children with ASCs, though the precise interconnectivity between these skills is unclear.

1.5 Theoretical accounts of differences in play

Researchers have proposed a number of theories regarding the link between play and joint attention skills (Charman, 1997). While some theorists suggest that early impairments in joint attention lead to impoverished development of the representational abilities that underlie symbolic play and the development of social cognitive skills (e.g. Rutherford & Rogers, 2003), others account for the impairments in both joint attention and play as symptoms of more basic cognitive deficits in attention or executive functions (e.g. Jarrold, et al., 1996). Empirical studies support the proposition that play is important in the development of social cognitive skills in children with ASCs. Other studies indicate that the reverse is also true; and some researchers have used existing findings to argue for the bi-directional nature of associations between social development and play.

Mundy, Sigman, Ungerer and Sherman (1987) found that in 3 to 6 year old children with ASCs, their ability to engage in symbolic play was positively associated with responses to joint attention. Similarly, Manning and Wainwright (2010) compared the observed play and social behaviours of a group of children with ASCs to a group of children with developmental language disorders. Thirty children with ASCs (M = 8 years 3 months) and 33 children with developmental language disorders (M = 8 years 6 months) were matched for chronological age and gender. Children completed a 25 minute videotaped session comprising 10 minutes working with a puzzle box, followed by a 15 minute semi-structured play session with an unfamiliar examiner. The examiner was non-directive during the initial 5 minutes of the play session, and then gradually increased attempts to elicit age appropriate play, ranging from symbolic play to rules oriented games. The videotaped play sessions were coded for the developmental level of play, and also the time spent engaged at each level. The results showed that group

differences in the amount of time children spent engaged in functional play, symbolic play, and overall play scores were not significant. However, the children with ASCs engaged in games and conversation (a developmentally sophisticated form of play) significantly less, and scored significantly lower in social ratings, than the group with language disorders. The results also showed children with higher levels of play skill also had higher social rating scores where this rating was most clearly related to complex forms of play. Furthermore, the relationship between play and social skill was not moderated by diagnosis, suggesting that play is a general marker of social development. The authors suggested that social development in young children with ASCs might be facilitated by promoting the development of their play skills.

Related research (e.g. Whalen, Schreibman, & Ingersoll, 2006) explored whether an intervention to develop joint attention skills in children with ASCs can also foster improvements in play skills. Young children (M = 4 years 2 months) with ASCs were taught to initiate and respond to joint attention over a period of approximately five weeks. The impact of the intervention on play skills was also explored using both a structured play assessment and weekly 10 minute probes. The structured play assessment consisted of four prompting and modelling trials, targeting both functional and symbolic play. Structured play and spontaneous imitation was found to increase post intervention compared to baseline; however, there was no change in spontaneous play skills. It is possible that teaching joint attention leads to an increase in social motivation or improved attention, making children more responsive to their partner's prompting.

While this preliminary research provides support for an association between social communication skills and play, the specific nature of this relationship and the mechanisms responsible for the development of both skills remain unclear. There are currently a range of theories aiming to provide explanations and guide research activity exploring the developmental delays and differences in children with ASCs (Mastrangelo, 2009).

1.5.1 Weak central coherence theory. The weak central coherence theory (Happé & Frith, 2006) is based on the recognition that typically developing children have coherent processing abilities that are implicit and automatic, enabling rapid interpretation and integration of hierarchical information across a variety of processing levels. Conversely, children with ASCs have been found to demonstrate weak central coherence; meaning that they favour a processing style which prioritises individual pieces of information, rather than the coherent global picture (Morgan, Maybery, &

Durkin, 2003). This processing style leads to evident processing strengths in children with ASCs in some tasks - children with ASCs have been shown to out-perform typically developing children on tasks favouring local processing, such as block design (Mastrangelo, 2009). In contrast, effective play skills require an ability to integrate multiple competing pieces of information (e.g. using one object as if it were another). Differences observed in the play of children with ASCs may reflect an inability to derive high-level meaning in a play context where faces or toys are processed in a fragmented fashion (Lam & Yeung, 2012).

Recent research by Lam and Yeung (2012) found that children with ASCs (M = 6 years 11 months) produced significantly less spontaneous symbolic play compared to typically developing children (M = 5 years 6 months) matched for gender, chronological age, non-verbal IQ and verbal IQ. In addition, the children with ASCs performed significantly worse on measures of central coherence than the typically developing group, suggesting weak central coherence. Symbolic play scores were also significantly associated with scores on a task measuring central coherence, suggesting that central coherence is positively associated with greater frequency of symbolic play.

Some researchers have proposed that weak central coherence is a primary cognitive deficit in ASCs which may even account for deficits in theory of mind (e.g. Jarrold, Butler, Cottington, & Jimenez, 2000). Morgan et al. (2003) tested the explanatory power of the weak central coherence theory in accounting for differences in skills that are considered to tap theory of mind (joint attention and symbolic play) in young children with ASCs. Twenty one young children with ASCs (M = 4 years 6 months) and 21 typically developing children (M = 4 years 7 months) matched for gender, nonverbal ability, and chronological age completed tasks of joint attention, weak central coherence, and spontaneous play skills. The children with ASCs performed significantly better in tasks tapping weak central coherence, and significantly worse on measures of joint attention. However, no group differences were observed in symbolic play and performance in the central coherence task was independent from joint attention and the symbolic play scores in both groups of children. Furthermore, joint attention and symbolic play were poorly correlated both in typically developing children and those with ASCs, suggesting that these tasks tap separate cognitive mechanisms. Although previous research (e.g. Whalen, et al., 2006) has demonstrated a causal link between teaching joint attention and symbolic play, there were no effects of teaching joint attention on spontaneous symbolic play skills. Further research is required to clarify the

extent to which weak central coherence theory is able to account for the differences observed in the play of children with ASCs.

1.5.2 Theory of mind. Leslie (1987) suggested that more complex types of play, such as symbolic play, require metarepresentational abilities; a skill argued to understand others' minds. Researchers have argued that children who show theory of mind (ToM) skills are more able to negotiate social interactions using the perspectives of others, anticipate their intentions and understand their needs (Newton & Jenvey, 2011). Research has demonstrated that young children with ASCs have difficulty perceiving or understanding the thoughts of others and that related skills (e.g., the development of joint attention) are poorer compared with typically developing children (White, et al., 2011).

Leslie (1987) argued that the difficulties children with ASCs show in tasks tapping metarepresentational skills underpin the symbolic play deficits (Mastrangelo, 2009). A ToM requires an individual to be able to hold two different perspectives (e.g., their own interpretation, and that of another). Leslie (1987) argued that in symbolic play children also need to simultaneously hold two representations in mind – the primary identity of an object and a newly assigned pretend identity. Some research from typically developing children supports the link between ToM and symbolic play (Rutherford & Rogers, 2003); children who have higher scores on ToM tasks have more imaginary friends and active fantasy lives, and also engage in more joint symbolic play than children with low scores on ToM tasks (Astington & Jenkins, 1995; Taylor & Carlson, 1997).

Some researchers have challenged links between ToM and symbolic play problems in ASCs. For example, Rogers et al. (2005) noted that play difficulties in children with ASCs are prevalent in forms of play that do not require metarepresentational skills. Several studies have found differences in functional play as well as symbolic play in children with ASCs, compared to typically developing children (Sigman & Ungerer, 1984; Williams, et al., 2001). In addition, Rogers et al. (2005) point to evidence which shows children with ASCs can demonstrate symbolic play when prompted. For example, Lewis and Boucher (1988) found that when adults made verbal suggestions to elicit symbolic play acts, the specific deficits observed in spontaneous symbolic play were no longer present. The findings of this study have been replicated several times (e.g. Jarrold, et al., 1996) indicating that children with ASCs are able to perform more complex play behaviour in response to prompts, but that they may have a specific difficulty in generating such play behaviours themselves. Theorists have further

suggested that a child only needs to be able to metarepresent to understand another's pretence when that pretence differs from the child's own pretend reading of the situation, and therefore that often, symbolic play does not require metarepresentation (Jarrold, Mansergh, & Whiting, 2010). This suggests that children with ASCs experience difficulties in generating, rather than performing play acts in line with the executive functioning theory of ASCs.

1.5.3 Executive functioning theory. Some researchers have suggested that play difficulties in children with ASCs can be explained by central executive functioning deficits (Jarrold, et al., 1996; Lewis & Boucher, 1988). Executive functioning is an umbrella term for skills related to an ability to generate novel behaviours, formulate and initiate goal directed behaviour, inhibitory control, working memory, and flexible control of attentional processes (Ozonoff, 1997). A large body of research has found that children with ASCs show deficits in a variety of executive functioning tasks including those that tap set-shifting abilities and planning (Rutherford, et al., 2007). In this account, children with ASCs would show impaired functional and symbolic play where they are required to spontaneously show play behaviours (Mastrangelo, 2009).

Few studies have explored the relationship between executive function measures and play behaviour (Rogers, et al., 2005). In one study, Rutherford and Rogers (2003) explored executive functioning skills (i.e., inhibition and the ability to generate novel play ideas) and early indicators of ToM (i.e., initiated joint attention) as causal predictors of pretend play in children with ASCs. Generativity was assessed using a video recorded play session with four toys and coding for the occurrence of novel play behaviours. Spontaneous play was measured via a semi-structured play interview where the child was presented with a range of toys and prompted verbally to play. Further play acts were prompted verbally or via modelling by the examiner to measure performance. Twenty eight children with ASCs (M = 2 years 9 months old), and 24 children with developmental delays (M = 2 years 10 months old) were matched for chronological and mental age. A further 26 typically developing children (M = 1 year 7 months old) were matched for mental age only. The results showed that the children with ASCs produced significantly less spontaneous symbolic play than the other two groups of children. However, there were no significant between group differences on either of the executive function tasks, and no significant difference between the children with ASCs and the typically developing children on the measure of initiated joint attention. In addition, joint attention was not associated with symbolic play scores in any of the groups.

Generativity was, however, found to predict symbolic play scores across all the groups, supporting the executive functioning account of play.

In related research, Rutherford et al. (2007) conducted a longitudinal study to explore predictors of symbolic play skills in a group of children with ASCs. The predictive validity of executive functioning, ToM, social learning (which emphasises the importance of observational learning for the development of play skills), and cognitive maturity hypotheses (i.e. that pretend play develops as an individual matures cognitively) were explored, using measures of spatial reversal ability, joint attention ability, an imitation battery, and mental age respectively. Participants were assessed when they had a mental age of approximately 2 years, and again when their mental age was 3 years. To account for the different developmental rates of the children, the chronological ages at Time 2 varied (children with developmental delay $M = 4$ years 11 months; children with ASCs $M = 4$ years 10 months; typically developing children $M =$ 2 years 6 months). At baseline the children with ASCs demonstrated significant deficits in all play forms (prompted and spontaneous sensorimotor and symbolic play), compared to the other groups. At follow up the children with ASCs demonstrated significant difficulty in generating symbolic play compared to performing prompted symbolic play. There were no differences in sensorimotor play. This suggests that the children with ASCs demonstrated a significant difficulty in generating symbolic play schemes, but not in performing prompted symbolic play.

Consistent with previous research (e.g. Jarrold, 1997) this finding provides some support for the executive functioning hypothesis. However, this theory would predict deficits in all forms of spontaneous play. Furthermore, only joint attention, and not performance on the measures of executive functioning, predicted the development in spontaneous symbolic play over time. The authors suggested that given the empirical research indicating that social communication development in children with ASCs is both delayed and deviant (Clifford, et al., 2010; Leekam, López, & Moore, 2000), dyadic attention skills are likely to underlie the joint attention abilities that predicted the development of spontaneous symbolic play.

1.5.4 Social orienting theory. More recently, it has been suggested that the social cognitive differences in children with ASCs may act as potential precursors to delays in other developmental areas, such as play. Social orienting theory (Dawson et al., 2004; Mundy & Crowson, 1997) suggests that typically developing infants spend significantly more time orienting to social stimuli, and therefore have much greater access to social information than young children with ASCs (Dawson, 2008). While typically

developing children demonstrate remarkable sensitivity to social stimuli from birth, this is often not the case for children with ASCs (Dawson, 2008). Dawson suggests that this insensitivity to social information reflects a primary neurological deficit that serves to preclude the typical social and linguistic experiences that promote the development of associated neural pathways during early sensitive periods. This lack of input is suggested to cause further secondary pathological disruptions to brain and behavioural development (Mundy & Neal, 2001).

Accordingly, it has been proposed that the development of joint attention is preceded by dyadic processes involving affective sharing which are also disrupted in young children with ASCs (Hobson, 1993). Indeed, it has been noted that the pattern of communicative development in children with ASCs follows a predictable sequence that is both delayed and deviant from typically developing children (Clifford, et al., 2010). In contrast to the concurrent development of communication in typically developing children, there is empirical evidence for the suggestion that communication in children with ASCs develops sequentially (Leekam, et al., 2000; Wetherby, 1986). It is suggested that this sequence begins with behaviour regulation acts (e.g. protesting and requesting), followed by dyadic social interactions (e.g. showing off and requesting attention), and finally directing another's attention to an object or event (e.g. joint attention). Further research exploring the relationships between joint attention experiences and attention processes more broadly (e.g. dyadic social attention) with the development of play skills in ASCs and typical children is required.

Dawson (2008) argued that the failure to engage in social interaction and the impact on social and linguistic input could be reduced through early intervention. Furthermore, she argues that the atypical developmental trajectory in children with ASCs could be altered by helping to guide the brain towards a more typical developmental pathway by supporting the child to engage in social interactions. Preliminary evidence for social improvements in the intervention literature highlights the importance of developing early therapeutic opportunities for the processing of self-other experiences in a social forum (Mundy, Sullivan, & Mastergeorge, 2009). According to Mundy and colleagues the joint processing of own and other's actions and objects of attention becomes automatic and is likely to be fundamental to symbolic and social cognitive learning. Therefore early intervention that targets the development of socially engaged imitation, joint attention and affect sharing, may have a positive

impact on later development in language, as well as play and social skills (Landa, Holman, O'Neill, & Stuart, 2011).

1.5.5 Enactive mind theory. Similarly to social orienting theory (Dawson, et al., 2004; Mundy & Crowson, 1997), enactive mind theory (Klin, Jones, Schultz, & Volkmar, 2003) suggests that instead of the early predisposition to social stimuli seen in typically developing children a range of other physical inanimate stimuli may attract the attention of children with ASCs. As this process is repeated over time, it is argued that it leads to a neurofunctional specialisation in objects rather than people, therefore derailing the process of social cognition early in the child's development. Consequently, individuals with ASCs learn about the social world in different ways to typically developing individuals.

Research exploring the real life experiences of individuals with ASCs using eye tracking techniques has supported this theory. Studies examining the eye gaze of children with ASCs compared to that of typically developing children suggest that the core social difficulties present in individuals with ASCs are more pronounced in experimental tasks that utilise more realistic social stimuli. For example, research comparing the eye gaze of children with ASCs (M = 10 years 6 months) compared to that of typically developing children (M = 10 years 1 month) (van der Geest, Kemner, Verbaten, & van Engeland, 2002), found no significant differences when they were shown photographs of faces (i.e. a static rather than a dynamic representation of a social experience).

In contrast, another study found that individuals with ASCs looked towards human faces, and specifically the eye region, much less frequently than individuals without ASCs, matched for IQ, when watching dynamic video footage (Klin, Jones, Schultz, Volkmar, & Cohen, 2002b). Similarly, in contrast to typical viewers, individuals with ASCs ignored the non-verbal pointing gestures in video scenes (Klin, Jones, Schultz, Volkmar, & Cohen, 2002a). This was despite later verbal questioning which demonstrated that the individuals with ASCs fully understood and were able to verbally explain the meaning of a pointing gesture (Klin, et al., 2002a).

More recently, one study used the context of observing an adult-child play interaction to compare the eye gaze of children aged 1 year 8 months with ASCs (N = 28), to that of developmentally delayed children (N = 16) and typically developing children (N = 34) (Shic, Bradshaw, Klin, Scassellati, & Chawarska, 2011). During the 30 second video recording the children with ASCs showed less attention to the adult, and more attention to objects (such as toys) than the comparison groups. Further, the

toddlers with ASCs spent more time looking at the adult's body rather than their head compared to the typically developing children.

These results suggest that when individuals with ASCs are presented with realistic stimuli, the pattern of eye gaze deviates from that of typically developing participants. These studies have improved researchers' understanding of how individuals with ASCs find meaning in social situations, such as play environments. Attention to the activities of others is described as crucial for the learning and development of cognitive and social skills, such as joint attention and play (Shic, et al., 2011). In the context of dynamic, naturalistic play environments, this research suggests that children with ASCs are likely to focus on objects and spend less time looking at the eye region of play partners. This is likely to impact on their ability to engage in social learning or to benefit from joint attention "learning hotspots" during play (e.g. Bigelow, et al., 2004).

1.5.6 Summary. Play is recognised as an important point of early intervention for later language and social development (Christensen, et al., 2010; McConnell, 2002). Young children with ASCs demonstrate qualitatively different play skills to typically developing children. As in typically developing children, the play skills of children with ASCs are correlated with other early developmental skills, such as language, joint attention and social competence. Several cognitive and social cognitive theories propose to explain the differences observed in the play skills of children with ASCs. Currently some studies have demonstrated associations between central coherence and symbolic play skills (e.g. Lam & Yeung, 2012). Currently, several challenges exist with regards to the ability of theory of mind to explain the differences observed in the play skills of children with ASCs. One such challenge is the observation that children with ASCs are often more able to perform symbolic play acts when prompted, which supports the executive function theory as the difficulty is in generating play acts rather than performing them. The social orienting and enactive mind theories suggest that early intervention encouraging the development of social cognition may be self perpetuating by returning the associated neurodevelopmental pathways closer to the course seen in typically developing children. The enactive mind theory highlights the impact of the environment on the different attentional processes used by individuals with ASCs.

Consistent with several theoretical frameworks research with typically developing children and children with ASCs has found associations between play skills and social cognitive abilities. Linked to this research a range of interventions have been developed aiming to enhance play and social cognition in young children with ASCs (Klin,

Schultz, & Cohen, 2000). Some researchers have suggested that the social development of children with ASCs could be facilitated by promoting play skills (Manning & Wainwright, 2010); where play is argued to provide a framework for the emergence of skills related to social cognition and a context in which these skills can be enhanced and developed (Arthur, et al., 1999).

1.6 Play interventions for children with ASCs

Play behaviour has been found to be linked to key social and communication skills in development. Several studies have found that children with ASCs have qualitatively different play skills to typically developing children (Williams, et al., 2001). Researchers have aimed to develop interventions to enhance the play skills of children with ASCs (Guldberg et al., 2011; Manning & Wainwright, 2010). These interventions have aimed to explore whether children with ASCs can acquire, transfer and maintain play skills. In addition, some studies have explored the impact of teaching play on broader social and communicative skills. A critical consideration of the current literature base follows the description of the individual studies in order to avoid replication of common themes, and to consider the literature as a whole.

1.6.1 Can we teach play skills to young children with ASCs? Children with ASCs have been found to show a continuing reliance on sensorimotor play, and engage less in functional and symbolic play compared to children with developmental delays and typically developing children (e.g. Christensen, et al., 2010). Building on studies that have found children with ASCs demonstrate less functional play (Williams, et al., 2001) than their peers, some interventions have focussed on developing this aspect of play. Boudreau and D'Entremont (2010), for example, used video modelling to teach functional play to two 4 year old children with ASCs. This approach involves a child observing an adult modelling play via a video recording before being encouraged to copy the adult using identical play materials. Pre-existing assessments indicated that both children had developmental ages below 2 years. Intervention sessions were held between one and five times a week for 3 months. The number of modelled and unmodelled (but appropriate) play actions and scripted and unscripted (but contextually relevant) verbalisations were recorded during each play session.

The results showed that both children significantly increased the number of modelled play actions and scripted verbalisations performed per session during the video modelling phase compared to baseline. However, the frequency of unscripted verbalisations reduced during the video modelling phase. The addition of reinforcement (verbal praise and physical contact) during video modelling increased the frequency of

modelled actions and scripted verbalisations, but not novel play. However novel play (unmodelled actions and unscripted verbalisations) increased when the children were given novel toys. Four play sessions without the video assessed skill maintenance. Play actions (both modelled and unmodelled) and unscripted verbalisations were reduced, while the level of scripted verbalisations was maintained. One month later, one child did not perform any actions or verbalisations, and the other child performed all modelled actions and demonstrated an increase in unmodelled actions and scripted verbalisations.

This study indicates that the use of video modelling can have positive effects on the ability of some preschool children with ASCs to imitate scripted verbalisations and modelled play actions, where these generalised to novel toys. However, the lack of generalisation to unscripted verbalisations and unmodelled play actions suggests that video modelling did not lead to an increase in novel play behaviour.

Thomas and Smith (2004) also explored the effects of a brief intervention on the development of functional play skills of preschool aged children with ASCs. The intervention used play scripts with a combination of live modelling and imitation of the child's appropriate actions and verbalisations. The adult also over-emphasised positive emotional responses with the aim of creating social motivation for engaging in play. Three children with ASCs, aged between 3 years 4 months and 4 years 1 month received the play intervention for 5 minutes daily over a period of 2 weeks. Qualitative descriptions of participants' play ability at baseline varied considerably, from a non-verbal child who engaged in hand flapping, to a verbal child who played alongside others and who was beginning to show functional play. Children were video recorded engaging in free play in their preschool setting for 10 minutes pre and post intervention. Videos were coded for the cognitive (e.g. sensorimotor or functional play) and social levels of play (e.g. solitary or cooperative play) and the presence of verbal and non-verbal communication. Post intervention, all children spent more time engaged in functional play, parallel play and cooperative play. In addition, the frequency of social interaction behaviours, including eye contact and verbal communication, increased. Further, it was noted that the child showing the most limited functioning at baseline made the least change over the course of the intervention. However, other children used their taught play scripts as a basis to add their own novel ideas within their free play.

Other interventions have focussed on developing symbolic play skills in children with ASCs. Sherratt (2002), for example, used an intervention targeting symbolic play over a period of 4 months with 5 and 6 year old children with ASCs. Standardised

baseline assessments were conducted for verbal comprehension (children's scores ranged from 1 year 8 months, to 2 years 10 months) and play skills (ranging from 1 year 5 months to 3 years 10 months; as measured by The Reynell Language Developmental Scales and The Symbolic Play Test). The intervention comprised three phases of approximately five weeks each; reducing from adult, peer and video modelling of an entire play script in phase one to no modelling in phase three. Play sessions lasted for 40 minutes three times a week. As the phases progressed, the opportunities to observe symbolic play being modelled reduced and the materials available became more symbolic in nature (from using a box as a house with a variety of other toys in phase one to only providing junk materials in phase three). Following previous studies, the teacher used exaggerated expressions of positive emotion that reduced across the phases. All children demonstrated gains on a standardised assessment of symbolic play post intervention compared to baseline.

Some researchers have explored whether it is possible to teach children with ASCs the mental states of pretence, emotion or belief (Hadwin, Baron-Cohen, Howlin, & Hill, 1996). Thirty children with ASCs (aged between 4 years 4 months and 13 years 7 months) were randomly allocated to one of three treatment groups – emotion, belief or symbolic play. Each child's understanding of belief and emotion concepts and their level of play were assessed before they received any intervention. Teaching lasted for 30 minutes on eight consecutive days, or until the children reached criterion. In the play intervention group, a combination of modelling, verbal comments and suggestions were used to elicit functional and symbolic play acts. The results showed that children were able to show more spontaneous play skills following the intervention, though this improvement did not reach significance. The authors noted that it was possible to elicit symbolic play from all children with prompting, providing support for a difficulty in generating, rather than performing, symbolic play. Furthermore, teaching symbolic play did not result in generalisation in terms of the children's ability to pass emotion or belief tasks. The authors concluded that while the children in the emotion and belief groups were able to apply rules to pass the tasks, the application of such a strategy for generating play was not appropriate.

Some researchers have compared the effects of different teaching methods (e.g. Bernard-Opitz, Ing, & Kong, 2004). Eight young children with ASCs, aged between 2 years and 3 years 6 months, were matched for chronological age, ASC symptomology and play ability. A crossover design was used so that each child received the behavioural and play based interventions. The behavioural condition included discrete

trial training and adult directed teaching methods. The play based condition used toys and action, reinforcement, and a child-directed teaching style. Each intervention involved 30 hours teaching across 5 weeks. Parents took part in every session, and provided an additional 10 hours of intervention each week. Parent-child interactions were video recorded pre-intervention, post-intervention, and at a follow-up session. These were coded for compliance (i.e. following instructions), attending behaviour and communication. Further, the children completed standardised assessments of play and ASC symptoms pre and post intervention.

Over the whole intervention period, children showed positive gains in compliance, behaviour, communication and play skills. Differential effects for the interventions were also found; gains for compliance, attention, and communication were observed after children had received the behavioural intervention. In addition, the results showed a moderating effect of developmental level on outcome, with smaller changes evident for the two participants with the lowest initial cognitive levels. Further, children of parents who consistently recorded their home teaching hours and targets demonstrated the greatest improvements.

Another study by Jahr, Eldevik and Eikeseth (2000) aimed to enhance social play in children with ASCs. Six children aged between 4 and 12 years of age who showed little or no cooperative play but were able to perform play responses on toys upon verbal instructions, and verbally name toys and describe play activities, took part in the study. Standard IQ scores ranged from 43 to 81. Participants individually observed two adult models who demonstrated a scripted episode of cooperative play (e.g. model A builds a fence, and model B puts a cow inside the fence). Participants were then required to verbally describe the observed play sequence, before participating in the same play sequence. Four of the six children were not required to verbally describe the observed play sequence in order to explore the importance of the verbal description component. Training took place daily for an hour until they reached mastery (when the child could imitate and describe five consecutive play episodes consisting of three responses). Assessments took place at baseline, after mastery of training (when the participant could correctly describe and perform five consecutive two-response play episodes the first time they were modelled), and in novel settings and with new play partners. Maintenance was assessed 9 weeks and 10 months after training.

The results showed that, at baseline, none of the participants evidenced consistent cooperative play. At the mastery stage all participants could both initiate and sustain

cooperative play episodes. They were also able to maintain play for longer periods than in training, and they varied their play within and between play sessions. All of the children evidenced cooperative play with novel partners, in novel settings and skills were maintained at follow up. Participants whose training did not include the verbal description component failed to acquire cooperative play until this aspect was included in their training. This research extended previous studies to highlight the role of a verbal component in learning play.

Taken together, these studies indicated that it is possible to enhance the developmental and social level of play young children with ASCs engage in within free play environments through providing play interventions. The research suggests that some strategies, such as video modelling and rule based teaching, are less successful in enabling children to capture the spirit of natural, flexible play. Furthermore, there is a suggestion that the teaching style used in interventions aiming to enhance the play skills of young children is related to the impact of the intervention on broader skills.

1.6.2 The use of peer support in promoting play. Some studies have explored the use of peers in supporting the development of play skills in children with ASCs (Jahr, et al., 2000; Nelson, McDonnell, Johnston, Crompton, & Nelson, 2007; Wolfberg & Schuler, 1993; Zercher, Hunt, Schuler, & Webster, 2001). The inclusion of peers (versus adult-teachers) is argued to promote peer interaction and inclusive play environments (Nelson, et al., 2007; Zercher, et al., 2001).

The Keys to Play intervention (Nelson, et al., 2007), for example, used peer-mediated instruction techniques to teach the use of a visual cue (a laminated paper key) to initiate and respond to requests for peer play to four young children with ASCs. Qualitative descriptions of the children's abilities at baseline indicated that they used echolalia and incomprehensible language, and demonstrated delayed play and social interaction skills. During the intervention phase, the target children and typically developing peers of the same age received instruction in the use of the key. The typically developing peers received adult modelling and prompting to show the key to the target child; e.g., verbally ask the child to play or show them play materials. Adults then modelled and prompted (verbally and physically) the target children to demonstrate appropriate responses to the invitations of the peers. This research aimed to evaluate the effectiveness of the intervention for increasing initiations and responses to initiations in children with ASCs. The intervention took place for 30 minutes between two and four times each week. Due to the multiple baseline design of the study, and the fixed time frame of the school year, the intervention period was different for each child (ranging

from approximately fifteen to sixty sessions). By the end of the program, all children showed significant gains in the time spent engaged in play with others. Furthermore, there were concurrent increases in the social and developmental levels of their play (i.e., children spent more time engaged in parallel or cooperative play with peers, and more time spent engaged in more complex forms of play, such as symbolic play).

Wolfberg and Schuler (1993) explored the use of Integrated Play Groups for promoting cooperative play, and evaluated its impact on the percentage of time children with ASCs spent engaged in functional or symbolic play and social play. Integrated Play Groups aim to provide support for peer play where the environment is arranged to foster more competent forms of play, and as the children become more competent in initiating, joining, maintaining and negotiating play routines with peers, adults reduce their guidance. Three separate playgroups were set up, each containing two children with ASCs and three typically developing children (ranging between 6 years 11 months and 8 years 5 months). One child with ASCs from each group was used as the target child (ranging between 7 years 7 months and 7 years 10 months). No further information about the developmental level of the target children was provided. Playgroups were conducted twice a week for 30 minutes over a period of 3 months. Each playgroup session was video recorded and a 5 minute sample from each session was coded for cognitive and social level of play. All participants increased their time engaged in sensorimotor and functional play, and decreased their use of solitary play, while increasing their time engaged in parallel or cooperative play.

A further study explored the effect of the Integrated Play Group Model (Wolfberg & Schuler, 1993) on the development of joint attention initiation, symbolic play and language skills in 6-year-old twins with ASCs (Zercher, et al., 2001). Three typically developing children were trained to establish joint attention episodes, and model symbolic play, to develop the behaviours of the children with ASCs within social play situations. The Integrated Play Groups took place for 30 minutes a week for 16 weeks. A multiple baseline across subjects design was used. Observations were conducted pre and post intervention. The target children demonstrated increases in the frequency of their responses to peers' joint attention directing behaviours (e.g. pointing, gaze shifts, showing, giving, or verbal statements), symbolic play acts (e.g. object substitutions, attributing false properties to an object, or doll as agent play), and verbal utterances directed towards a peer (e.g. intelligible language produced in combination with a look towards a peer, speech in an audible voice, or the use of a personal pronoun or the

peer's name) during the intervention phase. There were no significant changes in the frequency of the target children's joint attention initiation behaviours.

Taken together these studies indicate that typically developing peers form part of interventions effective in developing the social interactions and play skills of young children with ASCs. However, it will be useful to extend research in this area by comparing the effectiveness of interventions including typically developing peers with those that only include adults.

1.6.3 Promoting social skills through play interventions. Given the associations identified between play and social and language skills, some interventions have aimed to develop play skills and to enhance a range of associated skills such as social functioning (e.g. eye gaze, joint attention, social play).

One early study explored the use of imitative mother-child play for promoting social responsiveness and creative toy play in children with ASCs (Dawson & Galpert, 1990). The mothers of 15 young children aged between 2 and 7 years (M = 47.5 months) with ASCs were asked to imitate their child's vocalisations and play with two sets of identical toys for 20 minutes a day over a 2 week period. Children's standard IQ scores ranged from 22 to 100 (M = 54.5), and social functioning was assessed using a scale based on by the Vineland social maturity scale with standard scores ranging from 43 to 88 (M = 60.6). Social responsiveness (vocalisations, positive affect, eye gaze) and toy play (the number of toy changes and toy schemes) were compared in video observations of free play and imitative play before and after the intervention. During free play mother and child sat opposite each other at the table with five toys and mother was instructed to play with her child as she normally would for 7 minutes. A second identical set of toys was presented for the imitative play condition. The mother was asked to imitate all actions made by her child, with the exception of destructive acts, and also encouraged to imitate their facial expressions, body movements and vocalisations. Pre intervention video recordings revealed that children spent significantly longer looking towards their mother's face, and significantly less time looking at their mother's play actions during mother-child imitative play, than during free play. The play condition did not predict any significant change in positive affect or vocalisations from the child pre intervention. After the intervention, children spent significantly longer gazing towards their mother's face during imitative play compared to pre-intervention imitative play, using both familiar and novel toys. Furthermore, the duration of children's gaze at their mothers' actions was significantly reduced during imitative play with familiar toys post intervention compared to pre intervention.

Interestingly, the number of child's toy changes and toy schemes also increased during imitative play post intervention compared to pre intervention and this increase was significant when children were playing with novel toys post intervention. There were no significant changes in children's vocalisations or positive affect over time, but parent questionnaires assessing intervention fidelity revealed that parents had not frequently imitated their child's vocalisations. This research provides an interesting insight into the different gaze patterns of children with ASCs when they are being imitated by an adult, and suggests that the use of this strategy in play interventions may also contribute to positive effects on social communication behaviours.

Given the identified associations between play and a variety of other developmental areas, it is perhaps surprising that not more researchers have investigated the broader impact of teaching play. Kasari, Freeman, and Paparella (2006) compared the effects of teaching play and joint attention skills to young children with ASCs. Fifty eight children with ASCs were randomised into treatment conditions of symbolic play, joint attention, or passive control. Trained experimenters worked with the children for 30 minutes daily for 6 weeks. Training sessions in both interventions comprised 5 minutes of table top discrete trial training, followed by semi-structured teaching on the floor. The floor based teaching involved strategies such as following the child's lead, talking about the child's actions, making eye contact and making environmental adjustments to engage the child. The child's toy play was also imitated, and the child's interests were used to develop play routines. The play and joint attention intervention groups showed significantly greater improvement than the control group in joint attention initiation skills (e.g. showing, pointing, giving coordinated looks). There were no significant differences between the play and joint attention groups. The joint attention group demonstrated significantly greater increases in responding to joint attention over time than the control or play group. While the gains of the joint attention group did not differ significantly over time from the play group with regards to joint attention initiation, the play group made significantly more progress in play (both in a standardised test environment and in a natural mother-child play scenario) than the joint attention group. This suggests that the children in the play group were able to generalise their skills to natural and social play situations. The authors suggested that while joint attention skills might be learnt during any child-centred approach allowing positive engagement with others, symbolic play skills might require direct teaching. Similarly, Whalen (2006) found that teaching joint attention did not result in gains in spontaneous symbolic play.

The longer term effects of the interventions were also assessed at 6 and 12 months post intervention (Kasari, et al., 2008). Both the joint attention and symbolic play intervention groups showed significantly more growth in joint attention initiations than the control group. There were no significant differences in growth of joint attention response skills over time by group. The symbolic play group made significantly greater gains in the number of novel symbolic play acts than the joint attention and control groups during the mother-child interactions. The play group showed significantly greater improvement than the joint attention or control groups. The children in the symbolic play intervention group demonstrated stronger effects on all measures at the 12 month follow up. This result suggests that teaching symbolic play skills also has an impact on the development of joint attention skills, which does not exist conversely. Therefore the presence of symbolic play skills may be a prerequisite to the development of joint attention skills. Furthermore, this is in accordance with several other studies (e.g. Dawson & Galpert, 1990; Thomas & Smith, 2004) where interventions aiming to enhance play skills, have had a positive impact on children's attention and social communication behaviours.

1.6.4. Limitations of Current Research. Studies that have aimed to increase play skills in children with ASCs have demonstrated broadly encouraging results regarding the ability of children with ASCs to develop play skills; however most research is limited by the absence of matched control groups (e.g. Wolfberg & Schuler, 1993), a lack of maintenance assessments (e.g. Dawson & Galpert, 1990), and small sample sizes (e.g. Thomas & Smith, 2004). In addition, Charman (2011) reported that, in contrast to other areas of child psychology, there is a lack of randomised controlled trials (RCTs) within this field. The use of RCTs allows greater understanding of the efficacy of interventions. This absence has resulted in ill-informed debate over several decades regarding the effectiveness of particular approaches (Charman, 2011). Rogers and Vismara (2008) report that the field is in the early stages of determining which interventions are most effective, which variables moderate and mediate treatment outcomes, and the degree of improvements that can be expected. Given the financial and emotional costs involved in early intervention for children with ASCs it is important to advance the field in this area (Rogers & Vismara, 2008). RCTs would strengthen the empirical evidence by clarifying the impact of various interventions.

Furthermore, the field is also limited by the absence of standardised intervention approaches and the descriptions of the approaches used within the research literature, limits the replicability and contribution of the study to a larger body of evidence (Lord

et al., 2005). In addition, assessment of children's ability to use their newly acquired skills in more ecologically valid environments is lacking in the intervention literature.

1.6.5 Summary. Several studies have explored the development and content of play in typically developing children and children with ASCs. Findings indicate that children with ASCs show qualitatively different play skills to typically developing children. Evidence indicates that executive functioning and joint attention are causally linked to play difficulties in children with ASCs. Indeed, more recent theoretical accounts of the differences observed in play focus on social cognition in children with ASCs, as these skills are thought to underpin a range of developmental areas, including play. It has been suggested that for children with ASCs, joint attention abilities may develop from and out of social engagement. Further, the social orienting and enactive mind theories suggest that children with ASCs are not predisposed towards social stimuli as typically developing children are. In accordance with research by Bigelow, et al. (2004), this causes them to miss opportunities to experience social engagement and practise and develop their existing play and social skills.

However, recent research (Kasari, et al., 2006; Kasari, et al., 2008; Whalen, et al., 2006) indicates that teaching joint attention skills to young children with ASCs does not necessarily have an impact on their play skills over time. Conversely, teaching symbolic play to young children with ASCs can improve play and joint attention skills (Kasari, et al., 2006; Kasari, et al., 2008), indicating that the development of play skills precedes the development of joint attention skills, or that joint attention is best taught in the naturalistic context of play.

In accordance with early theory, (e.g. Vygotsky, 1978) play is conceptualised as a platform for the development of a range of skills in children with ASCs. Consequently, a range of interventions aiming to develop play skills for children with ASCs have been developed. While the intervention research generally demonstrates encouraging results, the field is currently limited by several factors. A notable omission is the lack of RCTs in the field which limits the conclusions that researchers can draw about that intervention (Charman, 2011). Further, studies need to include a larger number of participants so that a broader range of outcome variables can be explored (Lord, et al., 2005). Given the identified difficulties individuals with ASCs have in generalising taught skills intervention outcomes should be assessed in social and natural contexts. It will be important for future research to provide clear descriptions of the interventions

used, and for outcomes broader than the direct aim of the intervention to be measured both in the short and longer term.

Chapter 2: Empirical Paper

Can a brief play intervention enhance social communication skills in preschool children with Autism Spectrum Conditions?

Play is defined as a pleasurable activity, without an externally imposed goal that consists of spontaneous, flexible and changing behaviours, and that involve active participation from the player (Jordan, 2003; Mastrangelo, 2009). Play emerges qualitatively and quantitatively across development with children displaying increasingly complex levels of play with age. Children engage in sensorimotor play (i.e. indiscriminate sensory exploration of objects) from approximately three months of age (Sheridan, 2005). Over time, they progress to include functional play (using toys according to their physical properties and for their intended uses) and then symbolic play (where the child attributes imaginary properties to a toy) in their skill repertoire (Jordan, 2003).

A large body of research has highlighted the benefits of play for child development. For example, more developmentally complex and social forms of play (e.g. social symbolic play) have been shown to predict social skills in peer interactions (Connolly & Doyle, 1984), as well as children's ability to make and maintain friendships and to understand emotional expression (Gagnon & Nagle, 2004). Conversely, increased levels of solitary play are positively associated with internalising and externalising problem behaviours and negatively associated with indicators of social competence, such as cooperation, friendliness and peer acceptance (Dodge, et al., 2002; Nelson, et al., 2008; Newton & Jenvey, 2011). Increased use of functional and symbolic play has also been positively associated with expressive and receptive language skills (Charman, et al., 2000; Lewis, et al., 2000).

Developmentally complex levels of play in children with Autism Spectrum Conditions (ASCs) are also positively associated with significantly greater social skills (Manning & Wainwright, 2010). In addition, language ability has been positively associated with play behaviour in children with ASCs both concurrently (Mundy, et al., 1987; Toth, et al., 2006) and over time (Sigman & Ruskin, 1999); with early play skills predicting later language development. These findings have led some researchers to argue that play facilitates the development of language in both typically developing children (Lewis, 2003) and children with ASCs (Sigman & Ruskin, 1999; Toth, et al., 2006).

Further research has shown that play skills in children with ASCs are both delayed and deviant (Rogers, et al., 2005). Children with ASCs are more likely to engage in

repetitive, ritualistic play with a limited range of toys (Paterson & Arco, 2007) and, compared to their typically developing peers, play in this group tends to be less complex (Kok, Kong, & Bernard-Opitz, 2002). Considering development, children with ASCs demonstrate a continuing reliance upon early forms of play, such as sensorimotor play (Libby, et al., 1998) with self-stimulating behaviours such as banging or flapping replacing more complex play. In addition, recent research has demonstrated that children with ASCs perform fewer novel functional play acts. Researchers have suggested that the repetitive nature of the play behaviours of children with ASCs are unlikely to interest their typically developing peers (Williams, et al., 2001). Consequently, the development of social play in children with ASCs has also been characterised as delayed and deviant (Beyer & Gammeltoft, 2000; Jordan, 2003; Wolfberg, 1999). While all children retain more solitary elements to their play, particularly when practising or experimenting with new play skills, play has been shown broadly to become increasingly social with age in typically developing children (Jordan, 2003).

Differences in social interactions and social cognitive skills more generally characterise children with ASCs from their earliest months, and often before diagnosis (McConnell, 2002). Typically developing children follow a pattern of social cognitive development whereby they demonstrate the simultaneous emergence of acts to regulate their own behaviour, initiate and maintain social interactions, and also engage in joint attention. In contrast, these skills emerge sequentially in children with ASCs (Clifford, et al., 2010; Leekam, et al., 2000).

Theoretical frameworks that aim to understand play in children with ASCs have highlighted the associations with their social cognitive skills. For example, the ability of young children with ASCs to engage in symbolic play is positively associated with their responses to joint attention (Mundy, et al., 1987). Consequently, researchers focussing on social-cognitive development suggest that early impairments in joint attention skills in children with ASCs contribute to the poor development of the representational abilities required for more sophisticated (i.e. symbolic) forms of play (e.g. Rutherford & Rogers, 2003). Furthermore, they have argued that the paucity of social interactions and joint attention behaviours evident early in life in children with ASCs has a wider impact on their development and ability to engage in social learning processes (Dawson, 2008). One study, for example, demonstrated that when children are able to engage in joint attention episodes within social play, they spend more time engaged in developmentally

sophisticated forms of play (e.g. functional play rather than sensorimotor play) compared to social play without joint attention episodes (Bigelow, et al., 2004). Given the highly social nature of play, it is possible that the delayed and deviant development of play skills in children with ASCs is related to their pattern of social-cognitive skill development (Clifford, et al., 2010).

Given the broad range of correlates of play, researchers have suggested that promoting the play skills of children with ASCs could facilitate social development (Manning & Wainwright, 2010). Consequently, the identification of play as a valuable focus of intervention efforts (Christensen, et al., 2010) has meant that researchers have developed a wide range of interventions (Guldberg, et al., 2011; Manning & Wainwright, 2010). The majority of these interventions have aimed to explore whether children with ASCs can acquire, transfer and maintain play skills. In addition, some studies have explored the impact of teaching play on broader social and communicative skills.

The research demonstrating a continuing reliance on sensorimotor play in children with ASCs (e.g. Williams, et al., 2001) has led some researchers to focus on developing functional play skills. For example, the Identiplay intervention involves an adult modelling functional play from a script detailing language and motor actions to an individual child who has a set of identical toys (Thomas & Smith, 2004). After 10 sessions, three preschool children with ASCs engaged in more developmentally complex (i.e. functional), and more social forms of play (i.e. parallel and cooperative play), compared to pre intervention. Furthermore, the children demonstrated increased use of eye contact and verbal communication post intervention. Video modelling has also been used to teach functional play. Boudreau and D'Entremont (2010), for example, found that following an intervention period of up to 3 months, with modelling occurring 3 times per week, children increased their use of the modelled actions and speech within their play. Other interventions have focussed on teaching children more complex forms of play, such as symbolic play. Sherratt (2002), for example, aimed to develop symbolic play in 5 and 6 year old children with ASCs, and showed that all children demonstrated gains on a standardised assessment of play post intervention compared to baseline.

Other studies have focussed on enhancing social play skills. For example, Jahr, Eldevik and Eikeseth (2000) taught cooperative play skills to six children with ASCs. Children observed adult models engaged in cooperative play. They were then required to verbally describe the play sequence, before participating in it themselves. Post

intervention and at follow up all of the children could initiate and sustain cooperative play with novel partners, in novel settings. Two children who had not been required to verbally describe the play script failed to acquire cooperative play until this aspect was included in their training.

Following the suggestion that the inclusion of typically developing peers in play interventions leads to increases in social interactions (Nelson, et al., 2007; Zercher, et al., 2001), a number of interventions of this type have been developed (e.g. Jahr, et al., 2000; Nelson, et al., 2007; Wolfberg & Schuler, 1993; Zercher, et al., 2001). For example, the Keys to Play intervention (Nelson, et al., 2007) teaches young children with ASCs to initiate and join peer play using a visual cue (a laminated paper key). Nelson and colleagues found that all children showed significant gains in the social and developmental levels of their play; see Wolfberg and Schuler (1993) for similar results.

In another study (Zercher, et al., 2001), typically developing children modelled symbolic play and initiated joint attention episodes with children with ASCs during Integrated Play Group sessions (Wolfberg & Schuler, 1993). After 16 weeks, the children with ASCs demonstrated increases in their use of symbolic play, responses to peers' joint attention behaviours, and verbal communication. Other researchers (Dawson & Galpert, 1990) have involved parents in delivering an intervention to promote social communication and play in children with ASCs. Mothers engaged in imitative play with their child for 20 minutes a day over 2 weeks. Children spent more time looking towards their mother's face, and showed more toy changes during imitative play pre and post intervention compared to during free play. No change in positive affect or vocalisations was found between play conditions.

A further recent study (Kasari, et al., 2006; Kasari, et al., 2008) used a randomised controlled trial (RCT) methodology to compare interventions targeting either symbolic play or joint attention skills in preschool children with ASCs. Children in both groups made significant gains within their targeted skill area; the play intervention group also showed significant gains in joint attention. The authors suggested that teaching play may facilitate gains in core social cognitive deficits in children with ASCs.

While the broader impact of interventions targeting the development of play skills have not been systematically explored (Lord, et al., 2005), one study compared the effects of two different interventions on the play skills, compliance and attention of children with ASCs (Bernard-Opitz, et al., 2004). A crossover design was used so that all children received each intervention for 30 hours across 5 weeks. Children in both

groups made positive gains in play, compliance, attending and communication. The behavioural intervention (an adult directed prescriptive teaching format at a table) led to greater increases in compliance and attention than the play based intervention (child centred flexible teaching through play). This suggests that interventions aiming to enhance the play skills of children with ASCs should explore a broader range of outcome measures, and that the active ingredients of different interventions should be compared.

While the intervention research has broadly demonstrated that it is possible to enhance children's play skills, several factors currently limit studies within this field. Very few studies have used random assignment of participants to groups (Charman, 2011; Sigman, Spence, & Wang, 2006). The internal validity of an RCT study is argued to address extraneous factors, such as selection bias (Portney & Watkins, 2009). Sigman, Spence and Wang (2006) also noted a heavy reliance on single subjects designs without control groups (e.g. Boudreau & D'Entremont, 2010; Jahr, et al., 2000; Nelson, et al., 2007; Thomas & Smith, 2004; Wolfberg & Schuler, 1993; Zercher, et al., 2001). Empirical papers often lack detailed descriptions of the interventions used, and manualised approaches are rare. Much of the current research does not include any investigation of participants' developmental levels at baseline, which limits the ability to draw conclusions regarding any moderators of the interventions. Furthermore, systematic exploration of children's ability to apply their newly acquired play or social cognitive skills outside of a controlled test environment or beyond the intervention sessions themselves is lacking. The findings of some recent studies (e.g. Bernard-Opitz, et al., 2004; Kasari, et al., 2006; Kasari, et al., 2008) provide support for the suggestion that evaluation of interventions targeting play skills should be conducted on a wider range of developmental and social skills (Lord, et al., 2005).

The current study added to the current literature base by utilising a randomised controlled design to explore the effects of the Identiplay intervention on the development of play skills and social communication behaviours in children with ASCs. Furthermore, assessments of play skill were conducted in both a test environment and during a naturalistic peer play session. The wider effects of the play intervention were explored in terms of the social level of children's free play, the social communication behaviours they demonstrated during the naturalistic peer play situations, and also through a teacher report survey exploring symptoms of psychopathology. A follow up assessment was also conducted to explore maintenance or delayed effects of the intervention.

Hypotheses

In line with the findings of previous studies (e.g. Kasari, et al., 2006; Thomas & Smith, 2004), it was hypothesised that the play intervention would lead to significant improvements in the developmental level of play skills within the experimental group compared to the comparison group. Furthermore, it was expected that these improvements would be maintained at follow up. Moreover, collateral effects of the intervention were expected, in terms of increases in the use of social play, social communications, and prosocial behaviours, and a reduction in peer problems, in the intervention group only.

Method

Design

A repeated measures randomised controlled design was used. Children were matched into pairs based on assessments of non-verbal ability, receptive language ability, expressive language ability and the extent of their social communication difficulties. Participants' scores on each of these variables were tabulated in rank order and the closest two participants were matched into a pair. Scores on the language assessments and the CARS 2 social communication difficulties measure were prioritised for closest matching where a participant's overall profile did not follow the typical pattern (see Table 5 for correlations between measures). Scores were visually checked for acceptable differences within pairs. Mean scores are presented in Table 2 and individual participant scores can be found in Table G1 in Appendix G. Each child was allocated a number by a random number generator, and the child with the highest number in each pair was allocated to the intervention group. Mann Whitney U tests (see Table 2) were used to check the between group differences on the matching measures. Assessments took place up to one week prior to the intervention starting and within one week of its completion, and children were followed up between five and six weeks after the intervention had ceased.

Participants

Participants were recruited from five Children's Centre preschools in the South of England who had agreed to act as host centres. Staff were informed of the inclusion criteria and asked to distribute consent packs to parents of eligible children. A total of 23 children were identified by preschool staff, and parental consent was obtained for 14 (61%) children (mean age = 41.07 months, $SD = 4.65$; $N = 12$ male). Twelve participants were receiving intervention from their local Speech and Language Therapy Service. Children did not necessarily have a diagnosis of ASCs ($N = 4$ parents reported their child had a formal diagnosis of Autistic Disorder). However, they were required to have been identified by at least two professionals (e.g. Paediatrician and Speech and Language Therapist) as having significant difficulties with social communication, such that it was likely that they would meet the criteria for an ASC. The following inclusion criteria were used: children were attending a Children's Centre preschool on a funded place for children with special educational needs (spaces are allocated based on the severity of the child's need). Children were also required to be free from any other medical condition that might adversely affect their development or the ability to benefit from the intervention (e.g. physical or sensory impairment). Children who had been

identified as having speech and language delay in the absence of any social communication difficulties, and children who had previous exposure to the Identiplay intervention were also excluded.

Measures

Matching Measures.

Severity of social communication difficulties. The Children's Autism Rating Scales Second Edition (CARS2) Standard Version (Schopler, Van Bourgondien, Wellman, & Love, 2010) was used to measure the severity of social communication difficulties. The manual reports good estimates of internal reliability (Livanis & Mouzakitis, 2010). The CARS2 assesses the frequency, intensity, peculiarity, and duration of various behaviours associated with ASCs. Fifteen domains are scored on a scale of 1 to 4 with higher scores indicating higher levels of impairment. Total scores can range from 15 to 60. Scores below 25.5 indicate that the individual is in the non-autistic range, with scores above that indicating increasing severity of symptoms (Chlebowski, Green, Barton, & Fein, 2010; Schopler, Reichler, & Rochen-Renner, 1988). Scores in the current sample ranged from 24.5 to 47.5 (individual participant scores can be found in Table G1). One child who scored 24.5 on the CARS2 was included in the study as they showed a high score on the Social Communication Questionnaire (SCQ) (Rutter, Bailey, & Lord, 2003) (see Table G1 in Appendix G). Internal consistency for the total scale is good, ranging from .90 to .93 (Chlebowski, et al., 2010), and .75 in the current sample.

Social communication questionnaire. The SCQ (Rutter, et al., 2003) is a 40-item parent-report questionnaire that measures their child's social functioning and communication skills. It is based on the DSM-IV criteria for autism spectrum disorders and is highly correlated with the ADI-R (Lord, Rutter, & LeCouteur, 1994). The first item of the scale is not used for scoring purposes but indicates whether the child is verbal or not. Therefore the range of the measure is 0 – 39. The SCQ was administered as a measure of autistic symptoms and scores ranged between 6 and 30. Internal consistency in the current research was good (.73).

Expressive language ability. The Naming Vocabulary subscale of the Early Years British Ability Scales II (BAS II) (Elliott, Smith, & McCulloch, 1997) was used to measure expressive language ability. Standard scores have a mean of 100 and a standard deviation of 15. In this scale, the child is shown a picture and asked to verbally name it. Internal reliability coefficients range between .55 and .91.

Receptive language ability. The Verbal Comprehension subscale of the BAS II (Elliott, et al., 1997) was used to measure receptive language ability. Standard scores have a mean of 100 and a standard deviation of 15.The child is required to point to pictures or manipulate objects in response to oral instructions. Internal reliability coefficients range between .79 and .89 and the measure demonstrates good test retest reliability (r = .80) (Elliott, et al., 1997).

Non-Verbal Mental Ability. The special non-verbal composite of the BAS II (Elliott, et al., 1997) was used to measure non verbal IQ. This comprises scores on two subscales. Standard scores have a mean of 100 and a standard deviation of 15. The Picture Similarities scale is a measure of non-verbal reasoning and requires children to place a picture card with another picture which shares an element. The Block Building subscale measures visual-perceptual matching and the child is required to copy a two or three dimensional design with wooden blocks. The non-verbal composite demonstrates good internal reliability (.82 to .92) and test retest reliability (r = .79) (Elliott, et al., 1997).

Outcome Measures.

Play. The Symbolic Play Test (Lowe & Costello, 1988) assesses the functional play of young children. Children are presented in turn with four different toy sets (e.g. one toy set includes a tractor, trailer, logs, and a driver) that allow for functional play and they are prompted non-verbally to play with the toys. The administrator observes the child's play and records whether the child performs typical functional play acts (e.g. sits driver in the seat, places the logs into the trailer). The scoring system denotes typical functional acts and the total score relates to the number of functional acts performed with the toy sets. Total scores range between 0 and 24.

Video Observational Measure. A ten minute video observation was conducted in a separate room in the child's preschool with three typically developing peers and a preschool key worker present. A variety of toys were available to the children for all videoed play sessions, allowing them to demonstrate a range of play behaviours (e.g. a tea set, doll and accessories, cars, small world figurines and accessories). At post intervention and at follow up, the toys the children used during the intervention were also available to the child, but no specific prompting of the child to play with those toys took place. This observational measure was used to generate three play indicators reflecting (1) the developmental level of children's play; (2) the amount of social play and (3) the presence of social communication behaviours. An independent rater blind to

group allocation and time coded 25% of the videos using the developed coding schemes for developmental and social levels of free play, and social communication behaviours.

Developmental free play score. The free play session was videotaped and each second was coded for play level using the coding systems for level of functional play (see Williams, et al., 2001 for the full measure). Cohen's kappas for inter-rater reliability are reported as being between .79 and .91 (Williams, et al., 2001). In the current study, a composite developmental play score was created by summing the following scores: no play - 0, sensorimotor play -1, functional play -2, elaborate functional play -3, and symbolic play -4 (to generate a total play score between 0 and 2400). A ratio developmental play score was then created by dividing the composite score by the total number of observations (play score/600) to create a possible range of play scores between 0 and 4. An inter-rater reliability analysis using the kappa statistic was performed to determine consistency. The inter-rater reliability was found to be Kappa = 0.62 ($p < .001$). Behavioural examples of each developmental play level are shown in Table 1.

Table 1: *Examples of observed behaviours and associated scores for the Developmental Play, Social Play, and Communication Behaviour Observation Schedules*

Scale	Category	Score	Example
Developmental Play	No Play	0	Child walking holding toy but not engaged with toy
	Sensorimotor	1	Child sucking plate
	Functional	2	Child puts cup on saucer
	Elaborate Functional	3	Child pushes car and says "brum brum"
	Symbolic	4	Child pushes block along and says "brum brum"
Social Play	Solitary	0	Child sits engaged with toy with back to peers
	Parallel	1	Child playing at table with playdough, showing interest in the play of peers in vicinity
	Cooperative	2	Child sat with peer/s and suggests that they "make a picnic for lunch"
Communication Behaviour	Behaviour Regulation	1	Child holds out hand to request toy
	Dyadic	2	Child acknowledges peer's interaction saying "yes"
	Triadic	3	Child quickly alternates gaze between peer and an object (e.g. peer, object, peer) in response to peer's exclamation, "look!"

Social free play score. The same videotaped 10-minute free play session was also coded continuously for social play. An extract of Rubin's (2001) Play Observation Scale was used to assess social play, and included the categories of solitary play, parallel play and cooperative play. Previous research using this scale with children with developmental delays reported a Cohen's kappa of .70 (Guralnick, Hammond, Connor, & Neville, 2006). We used a ratio social play score that was calculated by summing the total number of seconds across the ten minute play observation the child spent engaged in solitary play (0), parallel play (1) and cooperative play by (2) and then dividing the total score (possible range 0 - 1200) by the number of observations (600) to create a ratio score, ranging from 0 to 2. Examples of each level of social play are provided in Table 1. An inter-rater reliability analysis using the kappa statistic was performed to determine consistency and was found to be Kappa = 0.62 ($p < .001$).

Communication score. The 10-minute videotaped play session was coded for the presence of social communication behaviours using the M-COSMIC (refer to Clifford, et al., 2010 for the full measure). The M-COSMIC is a measure of social communication skills used with children with ASCs. Many of the M-COSMIC codes are significantly associated with social and communication domain scores on the ADOS and with scores on standardised measures of language, and reported intra class correlations for inter-rater reliability are good (above .66, $p < .001$) (Clifford, et al., 2010). The M-COSMIC uses event recording as the method of recording behaviours. In the current research an event recording coding system was used where the occurrence of three types of communicative function (behaviour regulation, dyadic interaction, or triadic interaction; see Table 1) was used in the analyses to create an overall communication score (i.e., the sum of behaviour regulation acts (1); dyadic social interactions (2); and triadic interactions (3), to create a total score between 600 and 1800. The total score was then divided by the number of seconds that the child was observed (N = 600), in order to create a ratio score between 0 and 3. The inter-rater reliability analysis using the intra-class correlation statistic was performed to determine consistency and was found to be 0.72.

Strengths and Difficulties Questionnaire. The Strengths and Difficulties Questionnaire (SDQ) (Preschool Version) (Appendix A) is a brief teacher report measure of prosocial behaviour and symptoms of psychopathology of young children (Goodman, 1997). The 25 items are responded to on a Likert scale ranging from "not true" to "certainly true". The measure consists of five scales of five items each, generating scores ranging between 0 and 10 for emotional symptoms, conduct

problems, hyperactivity-inattention, peer problems, and prosocial behavior. In the current research only the peer problems and prosocial behaviour subscales were used. Cronbach's alpha coefficients for these subscales indicate adequate internal consistency; .54 for peer problems, and .67 for prosocial behaviour (Van Leeuwen, Meerschaert, Bosmans, De Medts, & Braet, 2006). Reliability in the current research was good (.76 for peer problems and .70 for prosocial behaviour). Children's preschool key workers completed the SDQ in the current study.

Play Intervention. Identiplay (Phillips & Beavan, 2007) is a manualised play intervention that aims to increase the developmental level of children's play and encourage children to engage appropriately with a wider range of toys. Identiplay sessions are conducted daily for approximately ten minutes on a one to one basis. The adult and child each have identical toy sets, and sit facing each other at a table. Their individual work space is physically defined to increase predictability for the child. Identiplay combines adult modelling of play scripts with both motor and verbal content, imitation of the child's play and affective marking. Initially the adult models a functional play act as defined by the script. At this point, the aim is for the child to begin imitating the adult's play actions with their own toy set. As the child is repeatedly exposed to the script, it is expected that the child's imitation of the adult will develop and adapt so that they begin to include their own functional play acts. Where these adaptations are appropriate, the adult begins to imitate and incorporate the child's play into the script in order to reinforce their novel play. Furthermore, some scripts also have extensions in order to retain the child's interest and demonstrate the flexible nature of play once a child has mastered the basic play script. The play interaction is combined with affective marking techniques (e.g. exaggerated expression, anticipation, intensive interaction) in an attempt to increase the child's motivation for both play and social interaction. In the current study, each child's key worker independently selected a play script to teach from the 32 scripts published in the manual (Phillips & Beavan, 2007). This is an example of a play script taken from Phillips and Beavan (2007):

Cars

This kit contains: two toy cars, four play people.

Script:

Put one person in the car and say, "Man on car".

Push car along table and say, "Push car, brrm, brrm."

Say, "Finished".

Extension:

Introduce the other play person.

Carry out the previous script.

Drive the car to the other person and stop beside them. Say, "Stop the car."

Make the first person get off the car and say, "Man off car."

Say, "Hello friend! Come with me."

Put people back on car and say, "Two men in car".

Push car and say, "Push car; brrm, brrm".

"Finished".

Script selection was based on the adult's knowledge of the child's interests, and their current language and play level. In the current study, only one script was used over the two week intervention period. However the Identiplay intervention is often used over time to teach a variety of scripts in order to develop the child's play skills and associated language more broadly. This intervention was chosen as it has been adopted as an intervention within one large County in the south of England and therefore preschool staff in this area are trained in its delivery. Identiplay contains several elements (such as imitative play) which have been shown to enhance children's play and social skills. Furthermore, it was felt that the interactive and progressive nature of this intervention reinforced the flexible nature of play.

Procedure

Ethical approval was gained from the University's Ethics Committee and Research Governance Office (Appendix B). Seven Children's Centres in the south of England and where staff are trained in "Identiplay" (Phillips & Beavan, 2007) were approached. Five agreed to act as host centres. Members of staff from these Children's Centres were asked to identify children meeting the inclusion criteria, and to distribute information and consent packs to parents and guardians (Appendix C). The consent packs also included the Social Communication Questionnaire which parents were asked to complete. These packs were returned to the researcher in a stamped addressed envelope. Once informed consent was received, the remaining matching assessments (CARS2 and BAS II) were conducted by the researcher within the children's respective preschool settings. Participants were then matched into pairs, and allocated to either the intervention or comparison group.

Members of staff at the preschool settings were asked to pass information sheets and consent forms (Appendix D) to parents of typically developing peers who could then be video recorded engaged in free play with the participants.

All children in the intervention group received 10 intervention sessions over a two-week period. These sessions each lasted 10 minutes and were delivered by the children's preschool key worker. Children in the comparison group continued their usual preschool experience for the duration of the intervention period.

Outcome measures were obtained at baseline (up to one week prior to commencing the intervention), on completion of the intervention (up to one week after completion of the intervention), and five to six weeks post intervention. Play assessments were conducted by the researcher in a quiet room within the preschool settings. The video observations were recorded by the researcher in a side room within the preschools, so that only the children whose parents had given consent for them to be video recorded were captured on film. The SDQ was completed at each time point by the children's key workers.

Following completion of data collection, parents of participants (Appendix E) and playmates (Appendix F) were given a debrief.

Results

Matching Assessments

All participants completed assessments of non-verbal IQ, receptive and expressive language ability. A parent report measure of social communication difficulties and an observational social communication difficulties measure were also used. These assessments were used to match the children into pairs before randomly allocating one member of each pair to the intervention group and the other to a passive control group. Mann Whitney U tests showed there were no significant differences between the intervention and control groups on any of the measures, see Table 2. Scores for individual participants on each of these measures are shown in Table G1 in the appendix.

Table 2: *Means, standard deviations, Mann Whitney test values and significance values for baseline characteristic matching measures by group*

	Intervention Group	Comparison Group		
	Mean (SD)	Mean (SD)	*U*	*p*
Receptive language	23.29 (5.19)	27.29 (6.55)	33.5	0.23
Expressive language	29.57 (12.50)	36.00 (14.40)	32.0	0.32
Non-verbal ability	76.14 (17.70)	80.86 (14.70)	29.0	0.56
CARS2	37.64 (7.38)	32.14 (6.71)	11.5	0.96
SCQ	17.44 (8.16)	19.42 (8.59)	26.0	0.85

Note. CARS2 = Childrens Autism Rating Scales 2 (Schopler, et al., 2010); SCQ = Social Communication Questionnaire (Rutter, et al., 2003)

Approach to analysis

Data exploration revealed that some variables were not normally distributed (12%); therefore non parametric tests were used. Between groups differences at each time point were assessed using Mann Whitney tests (see Table 3). Table 4 shows mean scores on measures of play, social play, prosocial behaviour and peer problems at Time 1 (T1), Time 2 (T2) and Time 3 (T3).Within group differences across time (T1/T3) of the impact of the play intervention on the Symbolic Play Test scores, the developmental level of observed free play, social level of observed free play and social communication behaviours observed during free play, were explored using Friedman's ANOVAs. When these tests showed significant results, post hoc Wilcoxon signed ranks tests were

Table 3: *Mann Whitney Test Values and significance values at T1, T2 and T3*

Measure	Time 1	Time 2	Time 3
Symbolic Play Test	23.5 (.90)	19.5 (.54)	22.0 (.81)
Developmental Play Score	36.0 (.17)	17.0 (.38)	29.0 (.62)
Social Play Score	23.0 (.90)	24.5 (1.0)	24.0 (1.0)
Communication Score	24.0 (1.0)	24.0 (1.0)	20.0 (.62)
Prosocial Score	18.0 (1.0)	21.5 (.59)	23.0 (.49)
Peer Problems Score	17.5 (.94)	18.0 (1.0)	19.5 (.82)

used to explore changes over time in further detail. As key changes were expected between T1 and T2, and maintenance of these effects was predicted between T2 and T3, comparisons were made between T1 and T2 and T1 and T3. As the sample size in the current study is small, effect size (ES) is reported as this has been argued to yield a more appropriate interpretation of results (Ozonoff & Miller, 1995). ES are considered to be small (>.10), medium (>.25) or large (.4) (Portney & Watkins, 2009).

Significant positive correlations were found between language and non-verbal ability (see Table 5). These measures were also significantly negatively associated with scores on the CARS2. Positive significant correlations were found between Symbolic Play Test scores, social free play, social communication, and prosocial scores. A negative correlation was found between Symbolic Play Test scores and peer problems.

Symbolic Play Test Scores

Group Differences. Median and mean scores over time can be seen in Table 4. There were no group differences in Symbolic Play Test scores at T1, T2 or T3 (see Table 3). Mean scores and standard errors at T1, T2 and T3 are shown in Figure 1.

Time Differences. Friedman's ANOVAs revealed a significant effect of time for the intervention group, χ^2 (2) = 6.74, p = .02, but not the comparison group χ^2 (2) = 4.46, p = .06. Wilcoxon Signed Ranks Tests were used to follow up this finding and the

Table 4: *Means, (±standard deviations) and median scores for the Symbolic Play Test, Developmental Play Scores, Social Play Scores, Social Communication Scores and Strengths and Difficulties Questionnaire Scores at T1, T2 and T3*

Measure	Mean (SD) Median Intervention			Mean (SD) Median Comparison		
	T1	T2	T3	T1	T2	T3
Symbolic Play Test	12.71 (±6.85) 12.0*	16.86 (±7.38) 19.0*	17.00 (±8.64) 22.0	11.57 (±7.89) 12.0	13.86 (±8.80) 17.0	15.29 (±9.39) 20.0
Developmental Free Play Score	0.99 (±0.20) 0.97	1.34 (±0.31) 1.33*	1.15 (±0.26) 1.17	1.30 (±0.53) 1.29	1.17 (±0.37) 1.22	1.21 (±0.35) 1.32
Social Play Score	0.47 (±0.55) 0.22	0.59 (±0.69) 0.33	0.40 (±0.36) 0.32	0.35 (±0.40) 0.21	0.51 (±0.38) 0.66	0.41 (±0.35) 0.42
Communication Score	0.06 (±0.04) 0.06	0.10 (±0.09) 0.07	0.11 (±0.07) 0.11	0.05 (±0.04) 0.05*	0.08 (±0.04) 0.10*	0.08 (±0.04) 0.90
Prosocial Score	0.72 (±0.85) 0.5	0.95 (±0.71) 0.1	1.17 (±1.60) 0.5	0.72 (±0.57) 0.1	2.00 (±2.10) 1.5	2.00 (±1.67) 2.5
Peer Problems Score	5.33 (±2.58) 6.0	5.17 (±1.84) 5.5	4.55 (2.48) 4.64	5.35 (±1.86) 5.5	5.17 (±2.14) 6.0	5.17 (±1.47) 5.5

Note. * at T1 indicates T1/T3 significant change. * at T2 indicates T1/T2 significant change.

Table 5: *Spearman's correlations between matching assessments and baseline measures for all participants (N = 14)*

Variables	1	2	3	4	5	6	7	8	9	10	11
1. CARS2	-	.32	-.75#	-.82#	-.85#	-.25	.11	.08	.01	-.01	-.50
2. SCQ	-	-	-.15	-.27	-.29	-.42	.01	-.39	-.12	-.28	-.11
3. NVIQ	-	-	-	.86#	.88#	.08	-.12	-.11	-.09	-.34	.54
4. Recep Lang.	-	-	-	-	.97#	.11	-.13	-.07	-.08	-.18	.46
5. Express Lang.	-	-	-	-	-	.12	.18	-.15	-.14	-.17	.49
6. SPT	-	-	-	-	-	-	.22	.67#	.55*	.69*	-.08
7. Develop Play	-	-	-	-	-	-	-	.10	.36	.46	-.16
8. Social Play	-	-	-	-	-	-	-	-	.66*	.43	-.39
9. Communication	-	-	-	-	-	-	-	-	-	.42	-.07
10. Prosocial	-	-	-	-	-	-	-	-	-	-	-.54
11. Peer	-	-	-	-	-	-	-	-	-	-	-

Note. Spearman's Rho. CARS2 = Children's Autism Rating Scale 2; SCQ = Social Communication Questionnaire; NVIQ = Non Verbal IQ; Recep Lang. = Receptive Language; Express Lang. = Expressive Language; SPT = Symbolic Play Test; Develop Play = Developmental Play Score; Social Play = Social Play Score; Communication = Communication Score; Prosocial = Prosocial Strengths and Difficulties Questionnaire Score; Peer = Peer Problems Strengths and Difficulties Questionnaire Score.
* $p < .05$, two-tailed. # $p < .01$, two-tailed.

significance values were adjusted (critical value of .025) to account for the number of tests. Mean scores are shown in Figure 1. Within the intervention group, play scores significantly improved from T1 to T2 and the effect size was large, $T = 28, 2.38, p = .01$, $r = .64$. Play scores also increased between T1 and T2 for the comparison group; this difference was not significant, $T = 17.5, 1.48, p = .07, r = .40$. There was a significant effect of time between T1 and T3 for the intervention group, $T = 20, 2.00, p = .02, r = .53$, but not the comparison group, $T = 14.0, 1.75, p = .04, r = .47$.

Figure 1: *Mean Symbolic Play Test Scores and standard errors for the intervention and comparison groups at T1, T2 and T3*

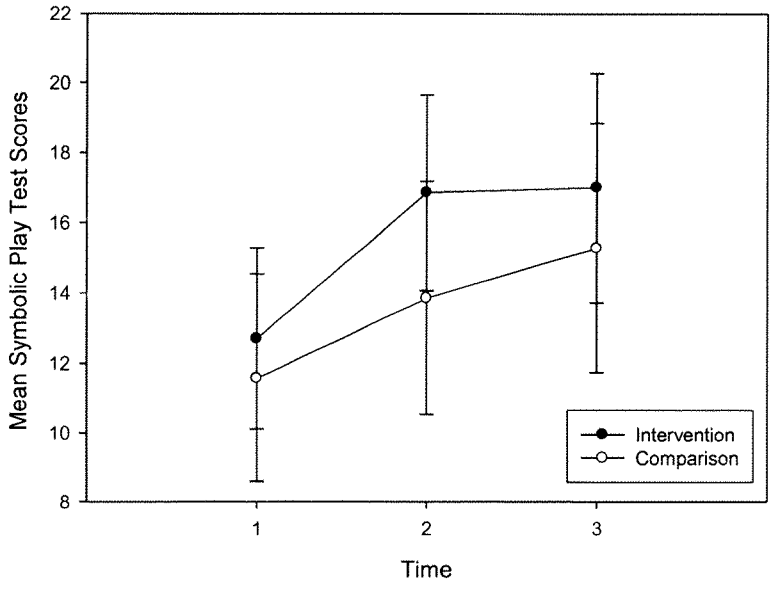

Figure 1. Mean Symbolic Play Test scores over time by group. Error bars represent standard errors. Possible scores range from 0 to 24.

Analysis of individual change in Symbolic Play Test scores. To explore changes at the level of the child, the Reliable Change Index (RCI) (Jacobson & Truax, 1991) was used to evaluate change on the Symbolic Play Test. The reliable change index score is a threshold (95%) at which the degree of change is unlikely to be a result of measurement unreliability or variability. Therefore the formula allows one to identify whether changes that occurred over the course of time exceeded a threshold that allowed factors such as measurement error to be dismissed. The formula to calculate reliable change is:

$$RC = \frac{X1 - X2}{Sdiff}$$

where X1 is the subject's pre-test score, X2 is the subject's post-test score, and *Sdiff* is calculated from the standard error of measurement:

$$Sdiff = \sqrt{2(S_E)^2}$$

The working of this formula is shown in more detail in Appendix H. Figure 2 shows the change scores in relation to the reliable change index for T1 – T2 and T1 – T3 change.

T1 – T2 Reliable Change Index Analysis. Symbolic Play Test scores were entered into a reliable change analysis. Based on the data, children's scores had to change by 6.55 points or more to cross the threshold for reliable change. The individual graphs show how the group results were achieved. Two children in each group met the criteria for reliable change with an index of 1.96.

T1 – T3 Reliable Change Index Analysis. Based on the data, children's scores had to have changed by 6.23 points or more to cross the threshold for reliable change. Two children in each group met the criteria for reliable change with an index of 1.96.

Figure 2: *Symbolic Play Test Score Reliable Change Analysis for T1-T2 and T1-T3*

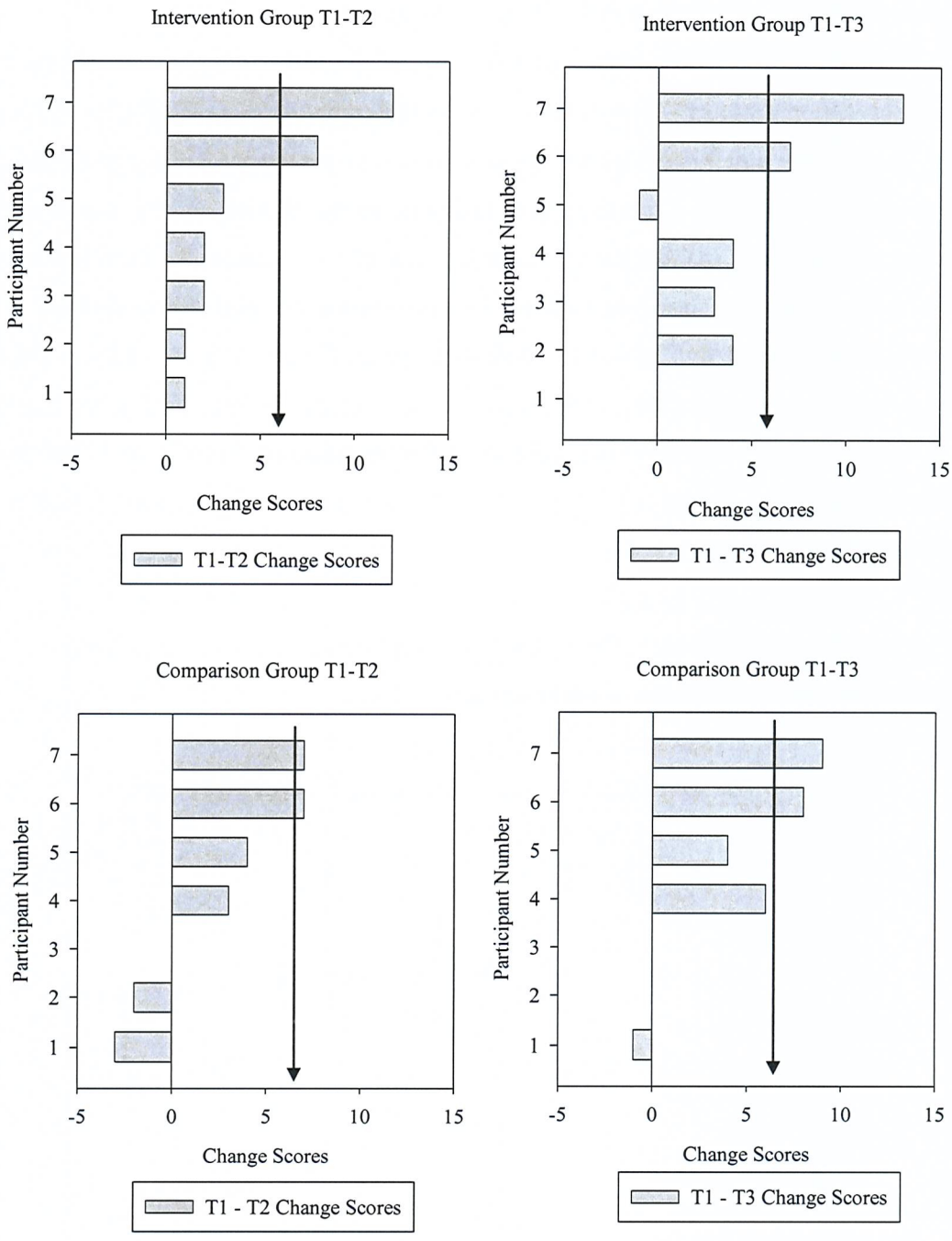

Figure 2. Symbolic Play Test change scores between T1-T2 and T1-T3 by group. Arrows indicate Reliable Change Criterions: T1-T2 Reliable Change Criterion = 6.55, T1-T3 Reliable Change Criterion = 6.23.

Play Observation Measures

Developmental Free Play Scores.

Group Differences. Median scores by group at each time point can be found in Table 4. There were no group differences at any time point (see Table 3).

Time Differences. Friedman's ANOVAs showed no significant effects of time for the intervention group, χ^2 (2) = 4.22, p = .06, or the comparison group χ^2 (2) = 0.86, p = .33. Because the time difference for the intervention groups approached significance, Wilcoxon Signed Ranks Tests were used to follow up this finding and the significance values were adjusted (so that the critical value was .025) to account for the number of tests. Mean scores are shown in Figure 3. Developmental free play scores differed significantly from T1 to T2 for the intervention group, T = 26, 2.03, p = .02, r = .54, but did not show significant change for the comparison group, T = 8.0, -1.01, p = .16, r = -.27. Developmental free play scores did not differ significantly from T1 to T3 for the intervention group, T = 16, 1.15, p = .13, r = .31, or the comparison group, T = 10.0, -.67, p = .25, r = -.18.

Figure 3: *Mean developmental free play scores and standard error scores for the intervention and comparison groups over time*

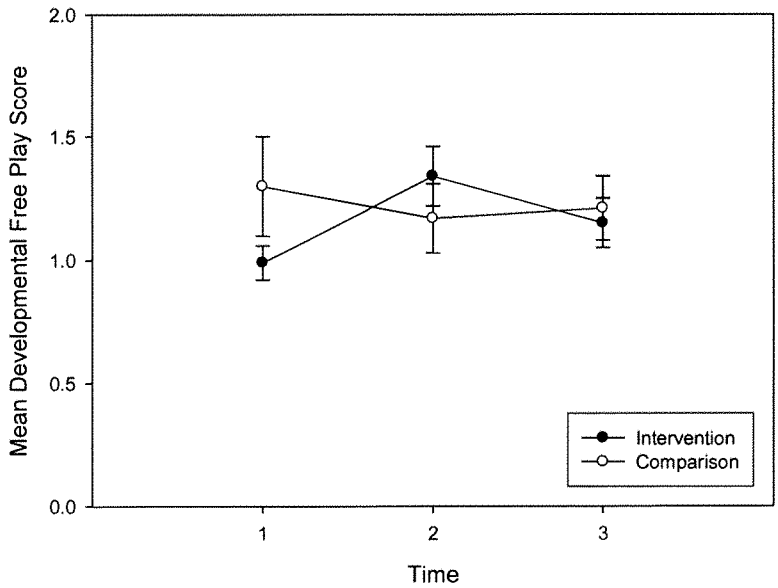

Figure 3. Mean developmental free play scores over time by group. Error bars represent standard errors. Possible scores range from 0 to 4.

Social Free Play Scores.

Group Differences. Social free play scores did not differ significantly between groups at any time point (see Table 3 for significance values).

Time Differences. Friedman's ANOVA tests showed there were no significant effects of time for the intervention group, $\chi^2(2) = 0.74, p = .48$, or the comparison group, $\chi^2(2) = 1.56, p = .23$.

Figure 4: *Mean social free play scores and standard error scores across time (possible range 0-2)*

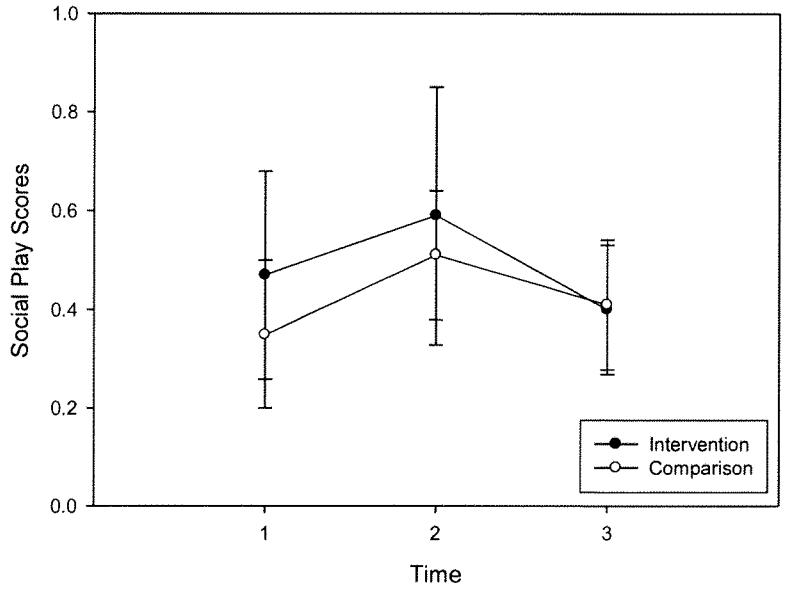

Figure 4. Mean social play scores over time by group. Error bars represent standard errors. Possible scores range from 0 to 2.

Social communication scores.

Group Differences. Social communication scores were not significantly different between groups at T1, T2 or T3 (see Table 3 for significance testing and Table 4 for mean and median scores). Mean scores are shown in Figure 5.

Time Differences. Friedman's ANOVAs revealed no significant effect of time for the intervention group, $\chi^2(2) = 2.0, p = .18$. However, there was a significant effect of time for the comparison group, $\chi^2(2) = 4.67, p = .05$. Post hoc analyses using Wilcoxon tests with Bonferroni corrections showed that social communication scores did not differ significantly from T1 to T2 for the intervention group, $T = 21.0, 1.18, p = .12, r = .32$. There was a significant increase in the frequency of social communication acts within the comparison group between baseline and post intervention, $T = 27.0, 2.20, p = .01, r = .90$. The change between T1 and T3 approached significance in the intervention

group, $T = 25.0, 1.86, p = .03, r = .50$, and reached significance for the comparison group, $T = 20.0, 1.99, p = .02, r = .53$.

Figure 5: *Mean communication scores and standard errors across time*

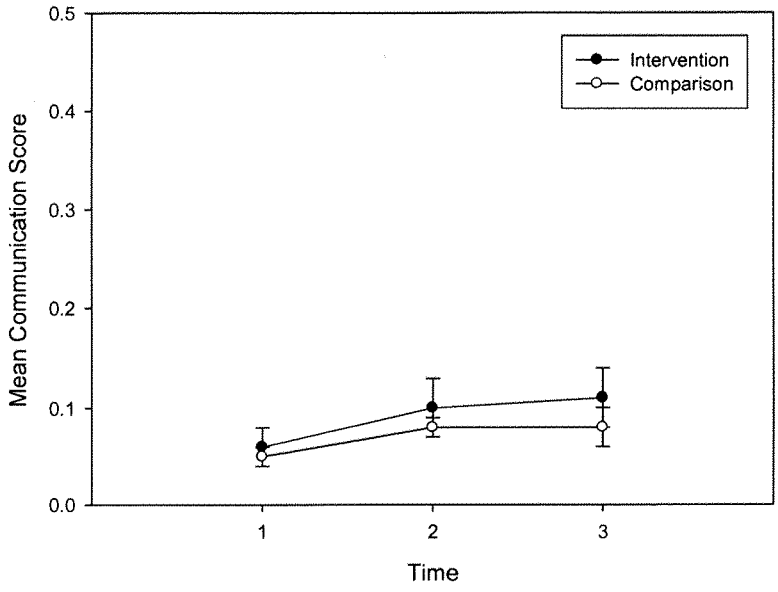

Figure 5. Mean communication scores over time by group. Error bars represent standard errors. Possible scores range from 0 to 3.

Prosocial scores

Group Differences. There were no significant differences in prosocial scores between groups at T1, T2 or T3. Mean scores are shown in Figure 6.

Time Differences. Friedman's ANOVAs showed there were no significant effects of time for the intervention group, $\chi^2(2) = 1.41, p = .25$, or the comparison group, $\chi^2(2) = 2.56, p = .14$.

Peer problems scores

Group Differences. There were no significant group differences at any time point. Mean scores are shown in Figure 7.

Time Differences. Friedman's ANOVAs revealed no significant effects of time for the intervention group, $\chi^2(2) = .36, p = .42$, or for the comparison group, $\chi^2(2) = .67, p = .36$.

Figure 6: *Mean prosocial scores and standard errors by group at T1, T2 and T3*

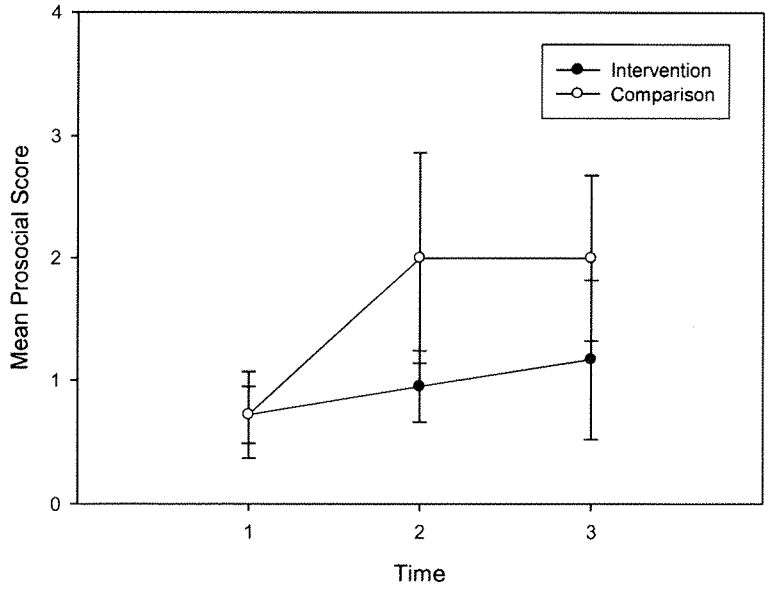

Figure 6. Mean prosocial scores over time by group. Error bars represent standard errors. Possible scores range from 0 to 10.

Figure 7: *Mean peer problems scores by group at T1, T2 and T3*

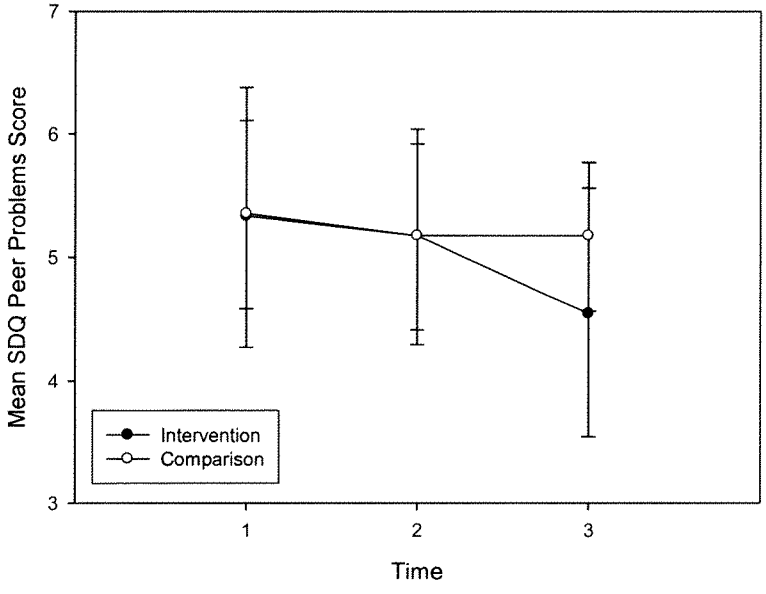

Figure 7. Mean peer problems scores over time by group. Error bars represent standard errors. Possible scores range from 0 to 10.

Discussion

The current study used a randomised controlled trial to explore the effectiveness of a play intervention on the play skills and social communication behaviours of preschool children with ASCs. Outcome measures included a play assessment, and observational measures of developmental and social free play, and social communication behaviours. Teacher ratings of children's prosocial behaviour and peer problems were also explored.

The results showed that the play skills measured at the group level (using a play test) increased in both the intervention and comparison group; though changes were significant for the intervention group only. Within the context of a naturalistic peer play environment, the children in the intervention group showed a significant increase in the developmental level of their play post intervention; the changes over time were not significant within the comparison group. There was no significant change for either group in social play over time. The comparison group showed a significant increase in social communication behaviours over time; the intervention group did not demonstrate significant change. There was no significant change in either group on the measures of prosocial behaviour and peer problems.

The improvement in play skills in the intervention group (within the test and the peer play environment) is consistent with previous research demonstrating that interventions targeting play skills can result in positive change for children with ASCs (e.g. Thomas & Smith, 2004). The maintenance of these skills at T3 (measured 5-6 weeks post intervention) on the play test fits well with other studies that have shown that gains made during an intervention period can be maintained at least in the short term. For example, several studies conducted by Kasari and colleagues (Kasari, et al., 2006; Kasari, et al., 2008) suggest that the gains made during an intervention period can be maintained over a much longer time (up to 1 year post intervention). These results fit well with the notion of attunement – where environmental factors can lead to higher levels of functioning over time (Aslin, Pisoni, Hennessy, & Percy, 1981).

Considering individual differences in change, the reliable change analyses indicated that all the children in the intervention group showed positive change, though this was most evident in two children. Similarly four children in the comparison group also showed positive change and this was reliable for two children in this group. Closer exploration of the four children who showed reliable change did not reveal any consistent link to baseline characteristics.

Analysis at the group level indicated negative change over time for developmental free play scores in the comparison group. In contrast, the intervention group showed significant positive change in their developmental free play post intervention; the increase in developmental play level within the intervention group was not maintained at follow up, and therefore the change between T1 and T3 was not significant. This finding is in contrast to the formal assessment of play skills, where there was positive significant change over time within the intervention group. These findings support previous research indicating that children with ASCs are often less able to perform skills within a natural dynamic environment (Klin, et al., 2002b). In contrast, the results of previous studies (Kasari, et al., 2006; Kasari, et al., 2008) indicate that children who received a play intervention daily over the course of six weeks made gains in their developmental play levels (a composite score derived from performance on a structured play assessment and a mother-child free play activity) that were maintained one year later. These results suggest that in order for the effects of the intervention to have a lasting impact within a natural play environment, a longer intervention period may be necessary.

Some researchers (e.g. Jordan, 2003) suggest that while children are practising newly acquired play skills, or experimenting with play ideas, they often prefer to engage in more solitary forms of play than they are actually capable of. The finding of no significant change in the level of social play in either group over time combined with the significant increase in the observed developmental level of free play within the intervention group between T1 and T2 would suggest that this could be the case within that group. Previous research (e.g. Thomas & Smith, 2004) has reported an increase in social play immediately after receiving the Identiplay intervention compared to baseline. However, this finding was not significance tested, and appeared to be driven largely by one of the three participants within that study. Further, this participant did not demonstrate positive change in the developmental level of their play post intervention. Other studies (e.g. Nelson, et al., 2007; Wolfberg & Schuler, 1993) where typically developing peers have been involved in developing the intervention have also reported increases in the levels of social play children engage in post intervention. However, a much longer intervention period (between 3 and 4 months) was used in both of these studies. Furthermore, the increased levels of social play found within these studies could result from the training received by the typically developing peers (e.g. to initiate interactions and invite the target child to play), rather than any positive change in the

target children's skills or motivation for social play. The ability of the target children to engage in social play with peers other than those included in the intervention was not explored in either of these studies.

Although both groups showed positive change in the frequency of their social communication behaviours over time, only the comparison group reached significance. This finding suggests that the recent move into specialist preschool settings has beneficial impact for children's social communication skills, and this change was more evident within the comparison group compared with the intervention group. Again, this finding could relate to the increased focus on developing and rehearsing play skills within the experimental group. However, some previous studies (e.g. Zercher, et al., 2001) have reported increases in older children's (6 years) social communication skills post intervention. However, a longer intervention period of approximately four months was used in this study. Furthermore, this change was not significance tested. According to the linear pathway of social communication development that children with ASCs are reported to follow (Clifford, et al., 2010) it may be that these older children were more developmentally ready to engage in joint attention behaviours than the younger children in the current study.

Further, previous research (Kasari, et al., 2006; Kasari, et al., 2008) exploring the differential effects of interventions focussed on teaching joint attention or symbolic play skills compared to a treatment as usual comparison group found that both intervention groups showed significant increases in children's ability to use joint attention post intervention and at follow up, compared to the comparison group. However, this was a composite score derived from assessment within a structured test environment and also a mother-child play interaction. It has previously been noted that children with ASCs often demonstrate fewer social communication skills within natural environments, compared to structured test environments (e.g. Hadwin, Baron-Cohen, Howlin, & Hill, 1997). The current study explored change in social communication skills within a natural peer play environment. Given the nature of the social communication difficulties children with ASCs experience, it may be that more immediate changes in social communication skills are noted within one to one interactions in more structured environments.

Furthermore, the study conducted by Manning and Wainwright (2010) found that the social functioning of children (within a one to one play environment with an adult) was associated with their ability to engage in play at a complex developmental level. Therefore, this may suggest that it is necessary for children's play skills to advance to a

high level (i.e. symbolic play) before their social communication behaviours progress. Similarly, the participants within other research where improvements in social communication behaviours (e.g. joint attention) have been found in relation to a play intervention (e.g. Kasari, et al., 2006; Kasari, et al., 2008) have been able to demonstrate symbolic play. Taken together, this suggests that in studies where concurrent improvements have been made in social communication skills after receiving a play intervention, children have been able to demonstrate higher levels of play initially compared to those within the current study. Furthermore, previous studies (e.g. Kasari, et al., 2006; Kasari, et al., 2008; Whalen, et al., 2006) have used structured test environments or interactions with one familiar adult to explore children's social communication skills. This is in contrast to the observational sample of peer play used in the current study. However, other studies have found that despite individuals with ASCs having a good understanding of the meaning of social communication behaviours and being able to perform them within structured test environments, they often remain unable to apply these skills within real world dynamic environments (e.g. Hadwin, et al., 1997; Klin, et al., 2002b).

There were no significant effects of time for either group on the measure of prosocial behaviour or peer problems. This finding indicates that a brief intervention aiming to enhance the play skills of children with ASCs does not have impact on wider symptoms of psychopathology in the short term. One study (Bernard-Opitz, et al., 2004) compared the broader impact of a behavioural play intervention with a play based intervention. The results showed that there were differential effects of the interventions; the behavioural intervention had positive impact on the children's behaviour, attention and compliance where the play based intervention did not. This indicates that a child led intervention such as Identiplay is unlikely to have wider impact on skills such as compliance (which may be indexed in the measures of peer problems and prosocial behaviour).

Limitations

While the findings of the current study add to the existing literature suggesting that children's play can be developed through exposure to intervention, there were several limitations. The current research used a sample of children who were not necessarily formally diagnosed with ASCs. However, given that these children had been prioritised to receive funded special educational needs preschool places, due to a number of professionals considering them to have a significant level of need with their social

communication skills it is likely that more of these children will receive medical diagnoses in time. However, future research should aim to address this by recruiting a wholly diagnosed sample. Furthermore, the sample size within the current study was small. As this limits the statistical power, effect sizes were also reported. Although a priori power calculations were conducted, it was not possible to predict the numbers of children who would meet the inclusion criteria in the following academic year when the research was conducted. Due to the time constraints around conducting the study, it was necessary for the recruitment phase to close before the required number of participants were recruited. The current study also made use of a relatively brief intervention period with a short follow up time frame. Again, this was necessary given the time constraints, but may have had an impact on the findings of the research. Compared to the majority of the intervention research, the intervention period in this study was shorter. A longer intervention period would have permitted the teaching of several play scripts in succession which may have revealed stronger and broader effects that were maintained over time. Indeed, this may have been a contributing factor for the lack of maintenance effects seen in the free play observation measures. For example, if children had been exposed to a longer intervention period, the intervention may have been more likely to contribute to lasting effects in children's play and social skills within naturalistic environments, as was hypothesised. In addition, although the majority of studies in this area have not included any follow up assessments, the 6 week follow up time period was significantly shorter than the 12 month post intervention assessment conducted by Kasari et al. (2008). The findings of Kasari et al. (2008) suggest that the effects of a play intervention on children's play and social communication skills become stronger with time. Given that the current study also aimed to explore the impact of the intervention on broader outcomes, such as prosocial behaviour and peer problems, a longer follow up period may have been more appropriate. As all the children had recently started attending preschool environments it is likely that this would be a period of skill development regardless of intervention exposure. Taken together, it is possible that these factors would have reduced the chances of finding significant effects. In the current study, the main researcher who coded all of the observational data was not blind to group allocation. This limitation was addressed by a research assistant, blind to group allocation, coding 25 percent of the videos. Inter-rater reliability calculations were calculated to check whether any bias was likely to have had an impact on the findings. Furthermore, the teachers who completed the prosocial and peer problems scales at each time point were not blind to group allocation and were the interventionists. However,

the lack of significant findings for either group on this measure does not indicate a high level of bias.

Future research and implications

This study supports the growing body of research suggesting that the play skills of young children with ASCs can be enhanced with intervention. It also adds to a small number of RCT studies within the field. Future research should continue to use this methodology, in order to increase the level of control within studies and the clarity regarding the efficacy of interventions. Larger samples of children would reduce error and also provide clearer information regarding possible mediating factors of the intervention. A longer term follow up period would be beneficial in developing our understanding of the maintenance of skills learnt during the intervention and therefore providing further support that Identiplay leads to attunement. The differences in the social play and social communication demonstrated within this study compared to previous research, indicates that further research is needed where the effects of intervention are explored on children's social communication skills within structured and natural environments, and in relation to the growth of their developmental play skills.

In educational psychology practice, exposure to the Identiplay intervention should be considered an effective method of enhancing the developmental level of play for children with ASCs. Currently, the research does not provide support for concurrent development of social play and communication skills within natural peer environments, suggesting that Identiplay might best be delivered in conjunction with evidence based interventions targeting these skills.

Furthermore, as some children within the comparison group also showed reliable change, future research should aim to clearly identify the factors making children most likely to benefit from this type of intervention. Those children who demonstrated reliable change within the comparison group did not appear to require such intervention in order to make good progress. Therefore identification of the factors making children more likely to benefit from interventions will be important in targeting intervention to those most in need.

Appendices

Appendix A: Strengths and Difficulties Questionnaire

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not certain or the item seems daft! Please give your answers on the basis of your child's behaviour over the last six months or this school year.

Child's name Male/Female
Date of birth

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	☐	☐	☐
Restless, overactive, cannot stay still for long	☐	☐	☐
Often complains of stomach-aches, headaches or illness	☐	☐	☐
Shares readily with other children (treats, toys, pencils etc)	☐	☐	☐
Often has temper tantrums or hot tempers	☐	☐	☐
Rather solitary, tends to play alone	☐	☐	☐
Generally obedient, usually does what adults request	☐	☐	☐
Many worries, often seems worried	☐	☐	☐
Helpful if someone is hurt, upset or feeling ill	☐	☐	☐
Constantly fidgeting or squirming	☐	☐	☐
Has at least one good friend	☐	☐	☐
Often fights with other children or bullies them	☐	☐	☐
Often unhappy, down-hearted or tearful	☐	☐	☐
Generally liked by other children	☐	☐	☐
Easily distracted, concentration wanders	☐	☐	☐
Nervous or clingy in new situations, easily loses confidence	☐	☐	☐
Kind to younger children	☐	☐	☐
Often argumentative with adults	☐	☐	☐
Picked on or bullied by other children	☐	☐	☐
Often volunteers to help others (parents, teachers, other children)	☐	☐	☐
Can stop and think things out before acting	☐	☐	☐
Can be spiteful to others	☐	☐	☐
Gets on better with adults than with other children	☐	☐	☐
Many fears, easily scared	☐	☐	☐
Sees things through to the end, good attention span	☐	☐	☐

Do you have any other comments or concerns?

Appendix B: Ethical Approval and Research Governance Letter

Reply Reply All Forward

Your Ethics Submission (Ethics ID:704) has been reviewed and approved

ERGO [DoNotReply@ERGO.soton.ac.uk]

To: Allen C.L.

08 August 2011 09:46

Submission Number: 704
Submission Name: Can we enhance the social interactions of preschool children through play?
This is email is to let you know your submission was approved by the Ethics Committee.

Please note that you cannot begin your research before you have had positive approval from the University of Southampton Research Governance Office (RGO) and Insurance Services. You should receive this via email within two working weeks. If there is a delay please email rgoinfo@soton.ac.uk.

Comments
1.I have approved this, but have a slight reservation as to whether we should be asking for details of the relationship to the children of the adults giving consent on behalf of those children; I think this would be normal practice. But since the letters are only going to the carers / parents, then I think we can probably assume that there will be no problems.The other slight concern relates to the video equipment. Please ensure that this will be safely kept out of the way of children who may risk tripping over tripod legs, etc. - or is it a hand-held camera?

2.Apologies that it took me a while to approve this, but I haven't been in the department recently, so was unable to view the paper questionnaires. Thanks for a clear application.

Click here to view your submission

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

UNIVERSITY OF Southampton

Miss Chloe Allen
School of Psychology
University of Southampton
University Road
Highfield
Southampton
SO17 1BJ

RGO Ref: 8260

10 August 2011

Dear Miss Allen

Project Title Can We Enhance the Social Interactions of Preschool Children through Play?

This is to confirm the University of Southampton is prepared to act as Research Sponsor for this study, and the work detailed in the protocol/study outline will be covered by the University of Southampton insurance programme.

As the sponsor's representative for the University this office is tasked with:

1. Ensuring the researcher has obtained the necessary approvals for the study
2. Monitoring the conduct of the study
3. Registering and resolving any complaints arising from the study

As the researcher you are responsible for the conduct of the study and you are expected to:

1. Ensure the study is conducted as described in the protocol/study outline approved by this office
2. Advise this office of any change to the protocol, methodology, study documents, research team, participant numbers or start/end date of the study
3. Report to this office as soon as possible any concern, complaint or adverse event arising from the study

Failure to do any of the above may invalidate the insurance agreement and/or affect sponsorship of your study i.e. suspension or even withdrawal.

On receipt of this letter you may commence your research but please be aware other approvals may be required by the host organisation if your research takes place outside the University. It is your responsibility to check with the host organisation and obtain the appropriate approvals before recruitment is underway in that location.

May I take this opportunity to wish you every success for your research.

Yours sincerely

Dr Martina Prude
Head of Research Governance

Tel: 023 8059 5058
email: rgoinfo@soton.ac.uk

Corporate Services, University of Southampton, Highfield Campus, Southampton SO17 1BJ United Kingdom
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Appendix C: Participant Information and Consent Pack

UNIVERSITY OF
Southampton
School of Psychology

20th July 2011 Version Number 1

Dear Parent/Carer,

I am Chloe Allen, a Trainee Educational Psychologist studying at the University of Southampton. I am writing to you, through your Children's Centre, to ask you whether you would like to take part in some exciting new research looking at how children can benefit from play! Play skills are important for children to learn as they lead to the development of many other skills such as language, social skills, and confidence. I am interested in seeing if we might be able to improve the social interactions of preschool children through developing their play skills.

I am currently conducting my doctoral thesis research on the evaluation of a brief play intervention called Identiplay. Identiplay is a very simple play intervention which has been used extensively throughout Hampshire to develop the play skills of young children with social communication difficulties. Identiplay teaches children how to play with different sets of toys, but also encourages social interaction. Therefore, if we can use play to develop important social and communication skills in children, we can target a child's development in these areas in a fun and enticing way.

I am looking to recruit at least twenty young children who may need some support to help develop their social communication skills and who would like to take part in my research. Please find attached some further information about what giving consent to take part would mean for your child. I would be very grateful if you would read through the information sheet about the research and give consent for your child to take part if you are happy.

If you are able to give consent for your child to take part, you will be helping us to understand the relationship between play and social communication behaviours, and whether this would be a good way to help children develop these skills. Your child will also benefit from taking part as there will be a focus on monitoring and developing their play and communication skills.

If after reading the information sheet you have any questions or concerns about the research please do not hesitate to contact me using the details below. I would be very happy to talk to you and answer your questions.

Thank you very much!

Chloe Allen

Trainee Educational Psychologist Tel: Email:
cla1g09@soton.ac.uk

UNIVERSITY OF Southampton

Participant Information Sheet 11th July 2011- Version Number 1

Study Title: Can we enhance the social interactions of preschool children with social communication difficulties through play?

Researcher: Chloe Allen **Ethics number**: 704

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

I am Chloe Allen, a Trainee Educational Psychologist at the University of Southampton. I am interested in developing the social interactions of preschool children and whether a short individual intervention might develop children's play and social skills. Play with peers is an important developmental goal and also has a wider, positive impact on the social interactions of children.

Why have I been chosen?

You have been asked to participate in this research study because your child has been identified as having difficulty with their social communication. We would like to help children with social communication needs develop their play skills.

What will happen to me if I take part?

If you agree to take part in the research, I will visit your child during one of their preschool sessions. I will observe your child and then carry out some short individual assessments. I will take a short video recording of your child playing with three other children. This will be used to analyse the play and social interactions of your child. You will be asked to complete two short questionnaires about your child, and your child's keyworker at preschool will also be asked to complete a short questionnaire. Your child will then be randomly selected to either receive a short individual play intervention each day for two weeks at preschool, or to continue their preschool as usual for two weeks. The intervention that will be used is called Identiplay. Identiplay teaches play and has been used with many preschool children with social communication needs across Hampshire. It will be delivered by your child's keyworker and takes 10 minutes each day. After two weeks I will visit your child at preschool again and repeat the video observation of them at play and do a short play assessment. I will ask your child's keyworker to complete the same questionnaire again. After a further six weeks I will repeat these assessments.

Are there any benefits in my taking part?

The study will put a focus on monitoring the development of your child's play and social skills at preschool. It will also help us to understand whether the delivery of a short play intervention is also likely to have a positive impact on the development of social interactions for preschool children with social communication difficulties.

Are there any risks involved?

There are no risks involved.

Will my participation be confidential?

I will comply with the Data Protection Act and the University of Southampton Policy. All information will remain confidential throughout the research (for example, your child's

data will be coded with a number (their name will not be used for research purposes) and stored on a password protected computer).

What happens if I change my mind?

You have the right to withdraw at any time without your legal rights being affected.

What happens if something goes wrong?

In the unlikely case of concern or complaint, you should contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton. SO171BJ. Phone: (023) 8059 5578.

Where can I get more information? If you have any questions after reading this information sheet then you may contact Chloe Allen (cla1g09@soton.ac.uk).

UNIVERSITY OF Southampton

CONSENT FORM (*Version 1, 11th July 2011*)

Study title: Can we enhance the social interactions of preschool children with social communication difficulties through play?

Researcher name: Chloe Allen

Study reference: CA1

Ethics reference: 704

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (11/07/11 /version no. 1) and have had the opportunity to ask questions about the study.	☐
I agree for my child to take part in this research project and agree for our data to be used for the purpose of this study	☐
I agree to my child being video recorded and understand that this data will be kept confidential, stored with a participant number, and destroyed after five years.	☐
I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected	☐
I am happy to be contacted regarding other unspecified research projects (for instance, we may wish to follow your child's progress across a period of time). I therefore consent to the University retaining my personal details on a database, kept separately from the research data detailed above. The 'validity' of my consent is conditional upon the University complying with the Data Protection Act and I understand that I can request my	☐

Data Protection

I understand that information collected about me and my child during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Name of adult giving consent (print name).....

Signature of adult giving consent .....

Name of your child who you are giving consent for.....

Date .....

Background Information About Your Child

I would like to start by asking some background information about your child. Please be assured that your responses will remain confidential.

Your child's name ..... Is your child a girl or a boy? .....

Your child's date of birth .....

What is the name of the preschool your child attends? .....

Who is your child's keyworker at preschool? .....

Days and times of preschool attended by your child
.....

Your address and contact telephone
number.....
.....

Does your child have any diagnoses of medical conditions? ..... .

Does your child have a funded Special Educational Needs place at the preschool?
.....

Do you or your child currently access support from any of these services?

Portage TOP PELICAN Educational Psychology

Speech and language therapy Occupational therapy

Other.....

What does your child like to play with?.....

Appendix D: Playmate Information and Consent Packs

UNIVERSITY OF
Southampton
School of Psychology

20th July 2011 Version Number 1

Dear Parent/Carer,

I am Chloe Allen, a Trainee Educational Psychologist studying at the University of Southampton. I am writing to you, through your Children's Centre, to ask you whether you would like to take part in some exciting new research looking at how children's social interactions and play skills develop! Play skills are important for children to learn as they lead to the development of many other skills such as language, social skills, and confidence.

I am currently conducting my doctoral thesis research exploring the links between the social interactions and play skills of preschool children. I would like to video record small groups of children playing at preschool during the autumn to gain a better understanding of how play and social interaction skills develop. I am writing to you to ask for your permission to include your child in the video recordings. Please find attached some further information about what giving consent to take part would mean for your child. I would be very grateful if you would read through the information sheet about the research and give consent for your child to take part if you are happy.

If you are able to give consent for your child to take part, you will be helping us to understand the relationship between play and social communication behaviours.

If after reading the information sheet you have any questions or concerns about the research please do not hesitate to contact me using the details below. I would be very happy to talk to you and answer your questions.

Thank you very much!

Chloe Allen

Trainee Educational Psychologist Tel: Email: cla1g09@soton.ac.uk

UNIVERSITY OF Southampton

Playmate Participant Information Sheet 20/07/11 Version 1

Study Title: Can we enhance the social interactions of preschool children through play?

Researcher: Chloe Allen **Ethics number**: 704

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

I am Chloe Allen, a Trainee Educational Psychologist at the University of Southampton. I am interested in understanding the link between the development of play and social interaction skills in preschool children.

Why have I been chosen?

I would like to gain a better understanding of how the play and social interaction skills of young children develop. I will do this by making short video recordings of small groups of four children playing together at preschool. I am therefore asking for your consent to include your child in my video recordings, together with other children. I will use the recordings to learn about the play and social interactions of children.

What will happen to me if I take part?

If you agree to take part in the research, there will be three occasions during the Autumn term when I will visit the preschool. A small group of children (including your child) will be asked to play together in a side room. I will video record the children playing and use the recording to assess the social interactions and play skills of the children. I will not interrupt the children's play or interact with them during the observation unless a child approaches me or indicates they no longer want to play. The video observations will last around 10 minutes each time.

Are there any benefits in my taking part?

The research will help us to understand the links between the development of play and social skills.

Are there any risks involved?

There are no risks involved.

Will my participation be confidential?

I will comply with the Data Protection Act and the University of Southampton Policy. All information will remain confidential throughout the research (for example, the video recording of your child will be stored on a password protected computer). After the video recordings have been analysed, they will be stored on a password protected computer for five years and then they will be destroyed.

What happens if I change my mind?

You have the right to withdraw at any time without your legal rights being affected.

What happens if something goes wrong?

In the unlikely case of concern or complaint, you should contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton. SO17 1BJ. Phone: (023) 8059 5578.

Where can I get more information? If you have any questions after reading this information sheet then you may contact Chloe Allen (cla1g09@soton.ac.uk).

UNIVERSITY OF Southampton

PLAYMATES CONSENT FORM (*Version 1, 20th July 2011*)

Study title: Can we enhance the social interactions of preschool children through play?

Researcher name: Chloe Allen

Study reference: CA1

Ethics reference: 704

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (20/07/11 /version no. 1) and have had the opportunity to ask questions about the study.	☐
I agree for my child to take part in this research project and agree for our data to be used for the purpose of this study	☐
I agree to my child being video recorded and understand that this data will be kept confidential, stored with a participant number, and destroyed after five years	☐
I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected	☐
I am happy to be contacted regarding other unspecified research projects (for instance, we may wish to follow your child's progress across a period of time). I therefore consent to the University retaining my personal details on a database, kept separately from the research data detailed above. The 'validity' of my consent is conditional upon the University complying with the Data Protection Act and I understand that I can request my	☐

Data Protection

I understand that information collected about me and my child during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Name of adult giving consent (print name).....

Signature of adult giving consent .....

Name of your child who you are giving consent for.....

Date .....

Appendix E: Participant Debrief

UNIVERSITY OF Southampton
School of Psychology

Can we enhance the social interactions of preschool children with social communication difficulties through play?

Debriefing Statement (21/07/11 – Version 1)

The aim of this research was to explore whether we can develop the social interactions of preschool children with social communication difficulties by improving their play skills. The information I have gathered through the research will help our understanding of the impact of developing play for the social interactions of young children with social communication difficulties. Once again results of this study will not include your or your child's name or any other identifying characteristics. You were not deceived during the course of this research. You may have a copy of this summary and the research findings (when completed) if you wish.

If you would like any further information about the links between play and social interaction, these are some recommended references:

- Moyles, J. (2005). The excellence of play. Open University Press: Buckingham.
- Phillips, N., & Beavan, L. (2007). Teaching play to children with autism: A practical intervention using Identiplay. Paul Chapman Publishing: London.
- Gammeltoft, L., Nordenhof, M.S. (2007). Autism, play and social interaction. Jessica Kingsley Publishers: London.

If you have any further questions please contact Chloe Allen at cla1g09@soton.ac.uk

Thank you once again for your participation in this research.

Signature _____ Date _____

Name

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ.

Phone: (023) 8059 5578.

Appendix F: Playmate Debrief

UNIVERSITY OF Southampton
School of Psychology

Can we enhance the social interactions of preschool children through play?

Debriefing Statement (21/07/11 – Version 1)

The aim of this research was to explore whether we can develop the social interactions of preschool children by improving their play skills. The information I have gathered through the research will help our understanding of the impact of developing play skills for the social interactions of young children. Once again results of this study will not include your or your child's name or any other identifying characteristics.

It was important for the identity of the children receiving the play intervention to remain confidential, and therefore you were deceived during the course of this research. You were not made aware that one of the children videoed playing with your child may have received a short play intervention. The involvement of your child in the research remained as explained to you on the playmate participant information sheet (20/07/11 – Version 1) - they were videoed on three occasions playing with three other young children. Your child did not receive the Identiplay intervention. You may have a copy of this summary and the research findings (when completed) if you wish.

If you would like any further information about the links between play and social interaction, or the Identiplay intervention these are some recommended references:

- Phillips, N., & Beavan, L. (2007). Teaching play to children with autism: A practical intervention using Identiplay. Paul Chapman Publishing: London.
- Moyles, J. (2005). The excellence of play. Open University Press: Buckingham.

If you have any further questions please contact Chloe Allen at cla1g09@soton.ac.uk

Thank you once again for your participation in this research.

Signature _____ Date _____

Name

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ.

Phone: (023) 8059 5578.

Appendix G: INDIVIDUAL PARTICIPANT MATCHING ASSESSMENTS

Table G1: *Individual participant scores on matching assessments of receptive language, expressive language, non verbal ability, and the extent of social communication difficulties*

	Participant Number													
Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Receptive language	34	20	20	28	24	20	29	24	25	20	20	20	38	32
Expressive language	47	20	20	39	25	20	45	45	35	20	20	20	56	47
Non-verbal ability	105	78	57	80	70	78	91	87	80	72	51	60	88	102
CARS2	30.5	47.5	45.0	30.0	32.5	36.0	28.0	30.0	36.5	32.0	40.5	46.5	24.5	29.0
SCQ	9	7	25	18	30	18	16	14	13	6	29	28	23	23

Note. CARS2 = Childrens Autism Rating Scales 2 (Schopler, et al., 2010); SCQ = Social Communication Questionnaire (Rutter, et al., 2003). Participants 1-7 = Intervention Group; Participants 8-14 = Comparison Group

Appendix H: RELIABLE CHANGE CALCULATIONS

The reliable change index measures whether people who have changed over time, such that that change is unlikely to be due to simple measurement unreliability. This is established by assessing whether the baseline and follow up scores have changed by a certain level. This level is a function of the initial standard deviation of the measure and its reliability.

The formula for the standard error of change is:

$$Sdiff = \sqrt{2(S_E)^2}$$

where *Sdiff* is the spread of the distribution of change scores that would be expected if no actual change occurred.

S_E is the standard error of measurement which is calculated by:

$$SE = SD\sqrt{1 - rel}$$

where SD is the initial pooled standard deviation of the intervention and comparison groups and *rel* indicates the test retest reliability of the measure.

The formula for criterion level, based on change that would happen less than 5% of the time by unreliability of measurement alone, is:

Reliable Change Criterion = 1.96 x *Sdiff*

where 1.96 is one standard error of change for z scores. Change exceeding 1.96 times this standard error is unlikely to occur more than 5% of the time by unreliability of the measure alone.

SYMBOLIC PLAY TEST RELIABLE CHANGE SCORES T1- T2

The pooled standard deviation for both the intervention and comparison groups at baseline was 7.12.

The reliability of the measure between pre and post intervention scores for the comparison group was .89.

Thus:

$$SE = SD\sqrt{1 - rel}$$

$$SE = 7.12\sqrt{1 - .89}$$

$$SE = SD\sqrt{1 - rel}$$

$$SE = 2.36$$

$$Sdiff = \sqrt{2(S_E)^2}$$

$$Sdiff = \sqrt{2(2.36)^2}$$

$$Sdiff = \sqrt{12.14}$$

$$Sdiff = 3.34$$

$$RC = 1.96 \text{ x } Sdiff$$

$$RC = 1.96 \text{ x } 3.34$$

$$RC = 6.55$$

Change scores above 6.55 points can be considered to have changed reliably.

SYMBOLIC PLAY TEST RELIABLE CHANGE SCORES T1-T3

The pooled standard deviation for both the intervention and comparison groups at baseline was 7.12.

The reliability of the measure between baseline and 6 week post intervention follow up scores for the comparison group was .90.

Thus:

$$SE = SD\sqrt{1 - rel}$$

$$SE = 7.12\sqrt{1 - .90}$$

$$SE = SD\sqrt{1 - rel}$$

$$SE = 2.25$$

$$Sdiff = \sqrt{2(S_E)^2}$$

$$Sdiff = \sqrt{2(2.25)^2}$$

$$Sdiff = \sqrt{10.13}$$

$$Sdiff = 3.18$$

$$RC = 1.96 \times Sdiff$$

$$RC = 1.96 \times 3.18$$

$$RC = 6.23$$

Change scores above 6.23 points can be considered to have changed reliably.

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